



PROCEEDINGS FROM REGIONAL FARMER ORGANISATION TRAINING ON TECHNOLOGIES SUPPORTING OFF-SEASON VEGETABLE PRODUCTION



SPC
Secretariat
of the Pacific
Community



Australian Government
Australian Centre for
International Agricultural Research

PIFON

PAPP
Pacific Agriculture Policy Program



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Preamble

Growing vegetables and crops during the off-season (typically from October to March) has been a major issue for many farmers across the Pacific region. In these off-season months, the production of temperate vegetables such as tomatoes, capsicum, English cabbage, lettuces, watermelon and such are strongly hampered by high rain rainfall and high temperatures.

At a regional consultation in Sigatoka, Fiji from June 1-5, 2015 hosted by the Pacific Islands Farmers Organization Network (PIFON), participants from Papua New Guinea, Tonga, Solomon Islands, Vanuatu, Samoa and Fiji gathered to exchange and learn new methods in overcoming off-season constraints.

The workshop was funded by the European Union (EU) through the Secretariat of the Pacific Community (SPC) implemented Pacific Agriculture Policy Project (PAPP).

The organizations represented included Kastom Gaden Association from Solomon Islands, Samoa Farmers Association, Tonga Growers Federation, Teitei Taveuni, Papua New Guinea Women in Agriculture as well as small holder farm owners from the Participatory Guarantee System (PGS).

The protective cropping technologies research is an activity of the Australian Centre for International Agricultural Research (ACIAR) through their Integrated Crop Management (ICM)

project.

The four day workshop saw participants being introduced to various methods in overcoming the challenges of the off-season. These included how to create nurseries, crop management, pest and disease identification and management as well as the benefits and challenges of protective cropping systems. The participants also did extensive field visits around Sigatoka, Nadi, Lautoka and Tavua to view specially-designed protective greenhouse structures made possible through the ACIAR/PARDI research project.

A highlight was the visit to Nadarivatu in the Fiji highlands region to observe unique vegetable production in high elevation conditions and the ability for farmers to grow vegetables all year round.

The underlying message is that there is a huge market opportunity for undertaking vegetable production in the off season when prices are high and farmers are able increase their profitability. The training explored the different methods and ideas available that can help farmers overcome the constraints and seize the opportunity to make better profits. This will also strengthen food security aspirations in the Pacific by improving cropping systems to supply high-value vegetables year-round to domestic and potential export markets.



Opening and Welcome

Workshop Opening

Shalendra Prasad from the Fiji Ministry of Agriculture (MOA) Research Division and Vili Caniogo the team leader for the EU funded, SPC Implemented Pacific Agriculture Policy Program (PAPP) set the scene for the next four days with their opening remarks.

Prasad who is the Principal Research Officer for Horticulture emphasized the importance of off-season crop production for the region. Pacific farmers currently struggle with off-season crop production but by gaining knowledge of the various technologies and methods to confront the issue, skills can be improved and solutions found.

Caniogo in turn praised the collaboration between PIFON, SPC and the Fiji Ministry of Agriculture to partner in the regional training.

He gave special thanks to the Fiji Ministry of Agriculture for hosting the workshop at its research station in Sigatoka.

Caniogo further provided some background to the EU funded Pacific Agriculture Policy Program (PAPP) which has links to the Caribbean region, and is based around sharing and learning new ideas and methods. This also includes linking up with what other people around the world are doing about off season crop production. He pointed out that one of the key aspects of the project was to work closely with the farming organizations as a key entry point to farmers and vice versa.

"The voice of farmers, the needs of farmers is really important and I think we're in a time now where we are better organized in terms of determining the agenda for agriculture and also the agenda for national development for the country. So we are looking to build formal working relationships and funding relationships with organizations like PIFON. One of our key objectives is to strengthen the working of these organizations," Caniogo said.

The PAPP team leader added that the collaborative effort



Vili Caniogo
Team Leader - SPC/EU PAPP Project



The voice of farmers, the needs of farmers is really important and I think we're in a time now where we are better organized in terms of determining the agenda for agriculture and also the agenda for national development for the country

with PIFON, and representatives from the various farming organizations present was exactly the collaborative effort they were trying to encourage and build.

"It's a key objective not just for SPC but also for the governments and farming organizations like PIFON and the respective organizations as we work hand in hand to confront the challenges that are before us. A lot of these challenges is around off-season cropping. It has been a challenge for many years and its time that we confront them, and learn more about it. We need more training workshops like this and we shouldn't be scared to address the constraints or issues that we all collectively need to address."

Participants



David Hickes
(PGS)
Fiji



Erenimo Tui
(Tutu Rural Training Center)
Fiji



Nemani Susu
(PCDF - Nadarivatu)
Fiji



Lilian Ekbom
(Teitei Taveuni)
Fiji



Alfred Loli
(Loli's Enterprise)
Vanuatu



Barry Skature
(Farm Support Association)
Vanuatu



Oliver Iato
(Farm Support Association)
Vanuatu



Maylin Sese
(Kastom Gaden Association)
Solomon Islands



Mary Esekana
(Kastom Gaden Association)
Solomon Islands



Lasa Aiono
(Samoa Farmers Association)



Samalaulu Matealona
(Samoa Farmers Association)



Afukaipouli Tuivai
(Tonga Growers Association)



Ana Tuivanuvou
PIFON



Elenoa Fuli
SPC

Participants



Sisilia Sinipata
(Nishi Foundation) Tonga



Sione Sa'ili Takai
(Tonga Growers Association)



Maria Linibi
(WiADF) PNG



Kevin Gabriel
(WiADF) PNG



Kyle Stice
PIFON



Nitesh Nand
SPC



Shalendra Prasad
MoA



Aloesi Hickes



Sant Kumar
Bula Agro Enterprise



Elio Jovicich
PARDI-Protective
Cropping Project Leader
QDAF, Australia



Anare Caucau
MoA Research Division



Fereti Atu
SPC

A series of overlapping green squares and rectangles of various shades (light green, medium green, dark green) are positioned in the upper left and center of the image, partially covering the greenhouse structure.

DAYONE



The off season: Main constraints and Marketing opportunities

**Presentation by Kyle Stice
PIFON Managing Director**



Day one began with Kyle Stice discussing the constraints and marketing opportunities for off season crop production.

"It is an opportunity for farmers to increase their profitability," he told regional farmers at the workshop.

"If in their main season farmers are getting only \$3-\$4 a kilo for their crops, you're able to go one step further using different technologies different inputs and be able to sell your product at twice the cost. It is the biggest incentive for off season vegetables."

Off-season vegetable production in the South Pacific occurs typically in the months of October to March, when vegetable production is curtailed by high rainfall, high temperatures and humidity.

Temperate vegetables such as tomatoes, English cabbage, French bean, lettuce, cauliflower, zucchini and carrots grow poorly during this period compared to the main growing season, resulting in supply shortages and higher prices. Yet these high-value crops are in demand all year round by hotels and households.

"This is an underlying message that there is really a market opportunity for growing some of these crops in the off season but the constraints are significant. It's not a quick fix. And so the training is to look at the range of different tools and technologies that can help farmers to overcome some of those constraints and take advantage of those high

prices," Kyle said.

According to market statistics, Fiji currently imports around 165 tonnes of tomatoes, 75 tonnes of English cabbage, 140 tonnes of capsicum, 175 tonnes of cauliflower and broccoli and 200 tonnes of celery annually. The respective annual value of these imports is approximately FJD 685,000, FJD 190,000, FJD 725,000, FJD 485,000 and FJD 530,000.

The tourism sector is one of the major customers for these imports. Over the last few decades the tourism industry has created a huge domestic market after recording strong growths. In 2010, Fiji received approximately over 600,000 tourists staying an average of 9.4 days each. (Fiji Bureau of Statistics). This represents almost 17 million meals consumed, at three meals per day.

In 2006, the Fiji tourism industry imported FJ\$35 million in vegetables alone. This is despite the fact that local vegetables are cheaper than imported ones during the middle winter months of the year.

"It's definitely not something for all farmers. I think vegetable farming itself is very difficult, labour intensive, time consuming but when you go into off season production its' even more difficult - so what we have is a relatively small group of very business minded commercially oriented farmers who see that there is profits to be made and they target the off season," says Kyle.

Data for the last two years show that the monthly average market price for English cabbage falls below \$2/kg during the main season (Aug-Sept) and peaks to around \$6 in the off season. For capsicum, the average can fall as low as \$6/kg in the main season and reach as high as \$18/kg in the off season. The price variability is even greater for tomatoes - with average monthly price falling as low as \$2/kg in the main season and exceeding \$12/kg in the main season.

"The goal for this training was to explore the technologies and experiences available to help overcome the constraints during the off-season and capitalise on the market opportunities," says Kyle.



Overview of the technologies supporting off-season vegetable production

Presentation by Shalendra Prasad
Principal Research Officer for Horticulture
Ministry of Agriculture (MOA)



Speaking on the various protective crop methods available to farmers, the MOA's Shalendra Prasad urged farmers to get the consistency and quality right when producing their off-season crops.

Pacific farmers were well behind their counterparts in other regions in the area of off-season vegetable crop production.

"My presentation was about providing options to the growers on what sort of technologies are available for off season cultivation of vegetables," Prasad said.

"There are a wide range of systems and technologies available depending on the purpose and the amount of investment the growers put in. Most of our growers around the Pacific are so content to open field cultivation that it becomes a problem because during the off-season there is the high temperature and heavy rain intensity that destroys most of the crop and also makes land preparation very difficult. So we encourage our growers to use the simple yet effective technologies available that can solve this problem."

Among the methods shared was the use of low cost structures, raise bed cultivation, staking, use of plastic tunnel houses, as well as unused timber or bamboo, to protect the crop from the impacts of the season.

"Most of our farmers in the Pacific we are open field cultivators. In the off season you'll find problems with land use because of excessive rain, there is water logs in the fields. The other problem associated with that is high incidence of pest and diseases. So we need to have that knowledge and techniques of how we can control the pests and diseases," Prasad said.

"Another thing is to identify your crop varieties, once you've done that you need to raise the seedlings. There are some



There are a wide range of systems and technologies available depending on the purpose and the amount of investment the growers put in

direct seeded crops and transplanted crops. For transplanted crops you need to know how to raise the seedlings. Mostly in the main season the farmers make their seed beds and throw their seeds for germination. Maybe it's good for the main season but for the off season you might have to consider building proper nursery with proper shelter. Hydroponics is another option farmers can use to protect the crops from excessive rain."

New mobile app for farmers

Farmers and Agricultural Extension Officers will now be able to treat crops through the use of a mobile app on smart phones.

Called the Pacific Pathogens app, farmers and their extension officers will be able to find quick information on the pests and diseases that affect their crops as well as the solutions to treating it.

During the workshop, the regional participants were given a hands on demo of the app from Anare Caucau a Plant Protection Research Officer from the Fiji Ministry of Agriculture.

Currently there are 236 factsheets on the app giving information on the damage, biology and life cycle of the pests. If there is no way of saving the crop, the app will provide steps that can be taken to prevent the problem from occurring in the future.

The Pacific Pests and Pathogens app was developed through the Australian Centre for International Research (ACIAR) program providing support under a sub-regional (Fiji, Samoa, Solomon Islands and Tonga) Integrated Pest Management Project.

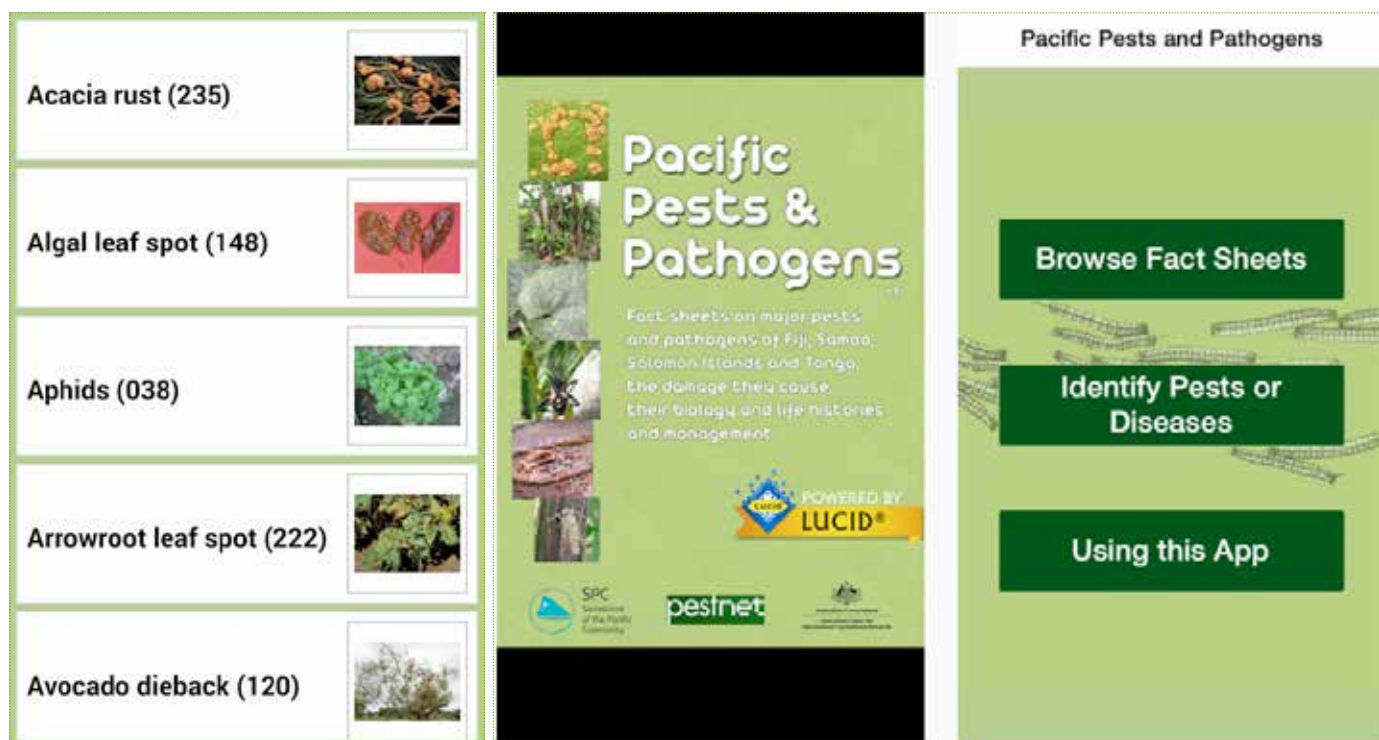
Farmers who don't have access to the internet or smart phone can visit the nearest agriculture office and contact their respective extension officers who can assist them.

According to Caucau the factsheets are shorter, less technical and easy to understand for farmers who are less familiar with English.

The mobile app is free and can be downloaded from Google or Apple Playstore and can be accessed offline without using the internet feature.

You can find the app on this link:

https://play.google.com/store/apps/details?id=com.lucidcentral.mobile.pacific_pests&hl=en



Be Smart about use of pesticides

Presentation by Fereti Atu
SPC - Integrated Pest Management Officer



Farmers should limit the number of times they spray their vegetables or they could eventually find their leafy vegetables overrun with insects, plant health experts have warned.

The SPC's Integrated Pest Management Officer Fereti Atu highlighted this in his presentation.

He said this had become an issue in Fiji after farmers complained of low yields with their leafy vegetables (such as cabbages) due to pesticides not being effective.

"The reason was due to farmers over spraying their leafy vegetables up to 14 times more than the usual spraying limit. This has resulted in insects developing resistance to the pesticide chemicals," he said.

Diamond back moth is a particular type of pest that has been plaguing farmers due to its resistance to all insecticides. It is found commonly on leafy vegetables such as cabbages. As part of the 'Integrated Crop Management' Project supported by ACIAR and FAO, Fereti and his colleagues have been working collaboratively to help educate farmers on how to manage the pest problem.

"The effectiveness of the spray takes 4 days," describes Fereti. "When you spray on the insects, it takes it 4 days before it dies. But with our farmers they want a quick fix, when they see the pests still alive, they spray 2-3 times more after 3 days and this is not good. After one season the pests will develop resistance against the chemicals. We've been working with the farmers to show them the right way to do it."

Fereti said the issue was identified after they carried out a survey among selected farmers in Sigatoka in 2009. Key findings revealed that 95% of the farmers used the chemical Pyrethroid to control the pests on the cabbages. Of the 95% surveyed, 72% said the chemicals were not working. They also found that farmers sprayed 2-3 times a week using chemicals such as Pyrethroid, Indoxacarb, Lufenuron, Organophosphate, Bt and Prevathon.

"Most of the farmers used Pyrethroid to control the Diamond back moth pest but 72% said they want new chemicals as the insecticide was not working. This was confirmed when we ran a lab test on the use and resistance ratio of the bugs. The benchmark or the cutoff ratio is anything above 10. The Diamond Backmoth had a resistance level to Pyrethroid at well over 190 folds! So the diamond back moth can withstand the amount of spraying that you do. Likewise with the other chemicals like-Indoxacarb which had a resistance ratio of 89."

Fereti adds they have identified a chemical called Bt or *Bacillus thuringiensis* an organic certified bio pesticide which the Diamond backmoth has not developed resistance to yet. However it is how the farmers will use the chemical that will be important.

"We've advised farmers to alternate their chemicals," Nitesh Nand, a plant Health technician at SPC says.

"I go out in the field to farmers doing Farmer Field School (FFS). FFS is an informal farmer school where groups of



farmers get together with the Agricultural Extension officers to monitor their farms. What we want is for farmers to alternate their chemicals and reduce the over spraying.”

“In Fiji we have seen farmers spray up to 14 times per cabbage and that’s too much. Imagine the number of sprays on the cabbage that goes to the market. We are doing trials and found that just by four sprays you can harvest the crop rather than 14. By doing so you have to alternate the chemicals too. There are five chemicals namely Indoxacarb, Lufenuron, Organophosphate, Bt and Prevathon . So we alternate these five chemicals when growing leafy vegetables. It doesn’t mean you have to buy all five chemicals at least you can use three chemicals to alternate to break the cycle of insect resistance to build up. When the farmers keep using one chemical all the time we found out that after a certain time the chemicals doesn’t work.”

“We’re spreading the word to reduce the number of sprays and at least spare the life span of the chemicals.”

The plant health technicians highlighted that it takes the industry ten years of lab work to come up with one pesticide and if farmers are not careful with the way they use it they can spoil the pesticide in only one season especially with the diamond backmoth bug.



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

Field Visit

With Dr Elio Jovicich

**Protective Crop specialist
Queensland Alliance for
Agriculture and Food Innovation**



Protective Crop specialist Dr Elio Jovicich is the project leader of the Queensland Alliance for Agriculture and Food Innovation at the University of Queensland (UQ).

He is involved with the Pacific Agribusiness Research for Development Initiative (PARDI) at UQ that is working with researchers in devising low cost structures for protected cropping systems around the Pacific.

During the workshop Jovicich led regional participants to the demonstration sites of these newly devised protective structures in Sigatoka, Koronivia, and Tavua. Samoa is also recipient of two protective structures, one at Nu'u Crop Research, and one at Edwin Tamasese's farm at Tapatapao.

According to Jovicich research on these structures began in 2013, before the five structures, each covering a ground area of 360 m² were built in Fiji and Samoa.

"Through the ACIAR/PARDI research project we looked at protected crop systems that can be adopted in countries within the Pacific. In Fiji, growers are now interested in off season crop production and also they are interested in minimizing the risks of losing production during the dry season," Jovicich said.

"At these field visits we discussed with the participants on how to trellis different crops especially with capsicum and tomatoes. Another big addition to this system is drip irrigation which is not very common here in Fiji. So we're also looking at different types of drip lines and their advantages and disadvantages."

Jovicich said that the purpose of using taller and better ventilated structures, such as the ones designed for the PARDI project, is to demonstrate that crops can be trellised to higher levels, and thus, production can be increased with more harvests throughout the season.

An issue that came up among the participants was the cost of these structures and its availability in their countries. Samoa Farmers Association representative Lasa Aiono shared the high cost of such protective structures such as fumes and the different shade cloths needed for their greenhouses and asked if there could be some partnership with commercial businesses to have these structures at affordable prices.

"Every farmer here is interested in these new technologies however we have to adapt to the cost we can afford," says Jovicich. "So we are trying to look at the variety and range of technologies. Everybody is interested at the outcomes the types of plants you can grow and the yields and quality that you can achieve."

"We have been experimenting with protected cropping and different type of growing systems for the plants under these structures, so the participants got to visit the three protective structures around Sigatoka and Tavua and see for themselves how feasible it is," Jovicich said.

Through the use of the appropriate low cost protective cropping systems the yield and quality of the high valued crops such as capsicum, tomatoes and leafy vegetables are expected to increase considerably.



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Production of High Value crops: Findings from recent ACIAR/PARDI research on tomato and pepper varieties

Presentation by Aloesi Hickes
ICM Project Coordinator



The growth of high-value crops for domestic consumption and export is seen as a priority for economic development and improved livelihoods in many Pacific island countries.

Former SPC Plant Health Technician Aloesi Hickes (who is now pursuing further studies) outlined some of the major issues faced by Pacific Island countries include slow economic development, high NCD problems and frequent extreme climatic events.

With these in mind the Australian Centre for International Agricultural Research (ACIAR) launched two projects in 2012 to support the sustainable intensification of high-value vegetable production in Fiji through the Fiji Ministry of Agriculture, Forestry and Fisheries (MAFF), Secretariat of the Pacific Community (SPC), University of Queensland (UQ), University of Sunshine Coast and the World Vegetable Center (AVRDC) who are partners in the project.

The project team were tasked with evaluating the high value crops in Fiji and Samoa. The priority crops identified for Fiji were cabbages, lettuce, tomatoes, capsicums, carrots, onions, potatoes, and peas while for Samoa it was eggplant, capsicum, cucumber, cabbage, tomatoes.

"This is an Integrated Crop Management Project funded by the Australian Centre for Agriculture Research and SPC works in collaboration with AVRDC – The World Vegetable Centre where we do variety evaluation of open pollinated varieties of capsicum and tomatoes introduced into Fiji by the world vegetable center," describes Aloesi. "We try to find out open pollinated variety of these two crops that are well suited or well adapted to our climatic conditions."

At this stage Aloesi and her team are working on a new tomato variety that will soon be released to farmers in Fiji later this year.

"We have a new variety that is going to be officially released early September and also have an ongoing variety and evaluation for capsicum so hopefully next year we can release an open variety of capsicum to our farmers," she says.

The new name for this tomato variety that will be released later this year is 'Melrose.'

"We grew these high valued crop varieties for 3 consecutive years," says Aloesi. "First at the Ministry of Agriculture Research Station then at other geographic areas to see which of those tomato varieties would be suitably adapted to our climatic conditions. There are some diseases this variety is susceptible but it has shown signs of tolerance towards it. They can withstand it if they are affected by the diseases."

Aloesi adds their work right now is working on the tomato variety growing in the regular season which the farmers are currently into. "In Fiji it's not easy grow these varieties in the off season but we are working on this. Our work is mainly on research where we bring our integrated crop techniques."

The plant health expert adds one advice for the farmers: "I heard during the workshop that farmers were complaining about the lack of seedlings available at the research station which is quite true. However one of the major thing I would like to see is for farmers to take up the challenge of saving their own seeds and even running their seedling production as a business and the timely management of their crops. For our Fijian farmers the most important thing is to change their mindset. They have to treat their farming as a business. You need to nurture your crops like your children. If you want to get money from your farm, you've got spend money on it – buy the chemical required to get the produce to a high standard."







DAY TWO



Shiri Prasad

Shiri Prasad was one of the two farms that participants visited in Buabua Lautoka, located west of Viti Levu. Spread out on a 22 acre farm, Mr Prasad plants high value crops including cauliflower, cabbages, capsicum and tomatoes.

He is a member of the Farm Field School (FFS) a group-based learning school used by SPC and the Ministry of Agriculture to promote Integrated Pest Management (IPM).

According to SPC Plant Health Technician, Mr Nitesh Nand, they accompany farmers to their farms and help monitor their vegetables especially cabbages to monitor pests.

The regional farmers saw how Shiri used sprinkler irrigation to control the insect population on his farm. "Irrigation prevents insects growing in the cabbages," says Nitesh. "It is one natural method that can be used instead of chemical sprays. SPC is taking a major role in this by supplying him with tanks as well as working with extension officers to conduct more Farmer Field Schools for cabbages when the need arises."

The FFS work has been going for over a year now.

Field Visit

Qereqere Company Ltd
(PGS member group)



The PGS program is an ACIAR- funded PARDI project where a group of small holder farmers form a company and run their farm as a business

On Day 2 the regional participants visited the Lower Valley farm of Qereqere Company Ltd which is part of the Participant Guarantee System (PGS) Project.

The PGS program is an ACIAR- funded PARDI project where a group of small holder farmers form a company and run their farm as a business. The group consists of a president, secretary and treasurer and is owned equally by members and profits are paid to members according to the produce they supply.

Qereqere Company Ltd is one of three companies that the PGS works with at the Sigatoka Valley. The other two being Narata Company Ltd, and Nawamagi Company Ltd.

The regional visitors viewed how the Qereqere Company Ltd organized their harvest and sell as a coordinated group to local resorts and supermarkets.

"The Qereqere Company Ltd consists of 15 farmers. They work on their five acre farm planting pawpaws and tomatoes," says PGS Coordinator David Hickes. "One thing great about this project is that the farmers are able to learn about forming a company and managing it. It gives them the knowledge on how to run their company as a business. All

three companies that is Qereqere, Narata and Nawamagi are legally registered businesses."

According to Hickes the farmers have an arrangement with leading resorts where they sell their high value fruit and vegetables.

"During the main season the PGS tomato farmers receive Fj\$4 per kilogram, an improvement of around Fj\$2 compared to sales made at municipal markets and roadside stalls. On the Off season the price goes up to F\$7.50 per kilogram," says Hickes.

The farmers supply their produce to one of the country's largest resort – the Fijian Shangri-La Resort and Intercontinental in Nadi. Indicated interest have also come from the Grand Pacific Hotel in Suva.

While this progress is considerable, Fiji's farmers have challenges ahead to maintain momentum and grow their businesses. It is hoped that further research support will enable them to perfect their processes. Local industry will need support to put structures in place to deal with obstacles, such as extreme weather or market fluctuations.

Profile

PNG Women in Agriculture: Maria on the move



Maria Linibi is a farmer from Papua New Guinea. Maria is the President and founder of the PNG Women in Agriculture Development Foundation (PNGWiADF) based in Lae.

She was one of the participants who took part at the Pacific Regional farmers meet.

Raised in a farming family, Maria returned to her roots after spending almost 30 years working in the PNG government as a communications specialist.

"I grow capsicum, citrus fruits and various vegetables on my three acre farm which I supply to supermarkets and hotels. In Lae, there's a port where ships come in everyday, the demand for fresh fruits and vegetables was very high. Continuous supply was an issue, and with the mines coming up, my group could not feed this demand. In the province alone we have three mines going and added to that the recent development of the industrial port at Lae. That's what

prompted me to start up this organization," she said.

Maria is also motivated by the daily struggles faced by women farmers in the rural areas.

"Setting up of the organization took me ten years to bring it to where it is. We have about 128 registered groups of 15-20 women. We have women members from the private sectors, entrepreneurs, doctors and scientists who have come on board. They see it as an avenue for them to reach out to us to help especially with trainings, and they feel empowered after joining the organization because they are able to stand on their own two feet. We provide trainings to them including access to new research information, farmer training, seeds and technologies, farm implements, finances, and short term exposure and engagement with overseas farmers," she says.

"It's easier to work with the women. I've worked with the men, they won't listen to me!" she says with a smile.




**Women in PNG are
 the major players of
 agriculture and it's about
 time that we link up with
 women farmers from
 around the region.**

Since its establishment PNGWiADG has seen effective partnerships and relationships with organisations both within the country and internationally. Among others that have supported PNGWiAGDF in various capacities include AusAID, New Zealand AID, Indian High Commission, Australian Centre for International Agricultural Research, Australian Women in Agriculture, and the Secretariat of the Pacific Community.

PNG is an agriculture based country. Agriculture contributes 26% to the national GDP with over 85% of the population depending on agriculture for their daily livelihoods.

"Being here at the farmers meet in Fiji, it helps me a lot. I want to go back and share the knowledge gained especially on the issues and pests and diseases, droughts how to cope with it and when to plant, how to be consistent with your supply etc. And how to deal with crop production especially during the off-seasons," she says.

"I would like to see a coordinated point here in Fiji because Fiji is central in the Pacific. I would like to see more linkages between women farmers in the region."

"We want to promote equal participation of women in agriculture, livestock and other natural resource development as well as improve and enhance women's status through economic development but there are challenges that have to be overcome. These include communication, infrastructures and social issues."

"PNG agriculture has huge potential to food security, cash income generation and increase in employment and reducing poverty. Women in PNG are the major players of agriculture and it's about time that we link up with women farmers from around the region. We have to learn from each other's experiences and new innovations. Seek technical and advisory services for capacity building and organizational planning and development," Maria said with determination.

Field Visit - Sigatoka Valley



Field Visit



Feedback

Lasa Aiono

Samoa Farmers Association

It was an eye opener. I see that not only us in Samoa are facing problems of high value vegetables during the off-season. Tourism is getting there, but our supply is very low, most of our production supply is very low even in the off season. Most of our vegetables are imported and we want to substitute that importation by changing the way we plant and the agriculture way of using things. I would like to have another follow up work shop.

Maria Linibi

PNG Women in Agriculture

I learnt a lot especially on farm irrigation, crop management, the different types of shade cloths to use and what types of crops can grow whether under the shade or in the open field. When I go back to my country, it will help me to design and prepare and maybe go for funding, to support our farmers that we can do something

Afu Keipo'uli Tu'ivai

Tonga Growers Federation

This training has benefitted me a lot. It has allowed me to exchange ideas with the other participants here. Especially on the methods and technologies available on off season crop production.

David Hickes

PGS Coordinator

Last year our PGS farmers suffered low yields during the off season production. At this training I told them to get as much information from this training. The PGS companies' objective is to maximize their revenue. We definitely want to target the off season, it's where we can make our profits.

Alfred Loli

Vanuatu Farmer

The field visits were very good. I'm a new farmer back in Vanuatu. It was interesting seeing how the Fiji farmers use simple methods in controlling pests and technologies to do protective cropping.



DAYTHREE



Profile

Sant Kumar: Regional farming Guru



Walking through Bula Agro Enterprise in Votualevu, Nadi you get the feeling you're in the presence of a farming guru. Vegetable seedlings packed succinctly in plastic cups, recycled tins, small rice bags and flaps from egg containers. Every bit about Sant Kumar's agro farm had its creative homemade technologies invented to cater to the preservation of his seedlings.

As you enter the gates of the farm you see containers lie stacked in the middle. One of the container serves as his home while the others his home made storage facility. It has served as a faithful protection shelter for his seedlings.

"The long-term goal is to improve farmers' access to a sustainable supply of vegetable seedlings," he describes as he took participants around his farm. "Farmers can adapt whatever means they have to create a proper nursery farm and employ management skills to effectively improve production of seedlings and consistency of supply to help farmers meet local and export market demand."

A leading expert in the horticulture export industry in Fiji, Kant spent 32 years working in the Ministry of Agriculture before

retiring to start Bula Agro Enterprise – a commercial farming nursery. He is a foundation member of the Fiji Organic Producers Association (FOA) and currently manages the Fiji Seedling Nursery Development Project funded by Australia.

He is also a commercial vegetable and fruit tree advisor for the Tutu Rural Training Centre (TRTC).

During the tour of his nursery farm, Sant showed his fellow farmers the various homemade techniques he adopted to grow his seedlings as well as its storage especially in times of natural disasters.

"I devised a very simple using a 20 foot container with shelves so you roll up the nursery and put it away," he says. "This is a temporary shelter for the seedlings during the cyclone season. That doesn't mean you have to have a 20 foot container, you can have an old cooler truck. I think during cyclone Evan (which struck Fiji in December 2012), I saved about 30,000 seedlings here. As soon as the cyclone goes the seedlings are ready for planting. So food security could be another thing, disaster mitigation, etc. This is the idea developed here at Bula Agro, hopefully the regional farmers

can take these back with them and adapt it to their farming methods.”

Dubbed as one of the biggest supplier of vegetable seedlings in the country Bula Agro can supply up to a million seedlings per month to farmers around the country.

“Bula Agro is a great opportunity for our participants; for farmers and nursery people to be able to talk directly to Sant Kumar about his farm,” said PIFON managing director and tropical horticultural specialist Kyle Stice.

“He is a very innovative and progressive farmer and some of his ideas are what we call home grown ideas, you can’t read about it from text books. This particular visit was for him to share his ideas and for him to take questions from participants and I think it has been fruitful. Seeing is believing and this particular farm is a perfect place to see commercial nursery work and commercial vegetable production in action,” said Stice.

“Using the nursery as part of an off season production tool is very interesting so how you can get a head start on the weather, how you can get a head start on pest and diseases and in that case the nursery is a valuable tool; and Sant does that pretty well. His famous disaster mitigation strategy is the container which he uses to protect his seedlings from cyclones.”

Dr Elio Jovicich of the Queensland Department of Agriculture, Fisheries and Forestry also praised Sant Kumar.

“We are seeing a range of technologies that can be used by medium and smaller farmers so Sant Kumar has a lot of experience in farming, he has tried a lot of technologies. There’s many of his experiences that can be transferred to farmers so we saw soil sterilization for preparing seedlings. We also saw how he protect seedlings and young plants in the nursery from high radiation and rain by using shade cloths and plastic covers and I think it complements all the information we’re getting from the tour. That there’s not one single solution for farmers. That farmers need to explore and try different options. I’m impressed with the variety of species that he can grow here from fruit trees, and vegetable seedlings.”

Says Lilian Ekborn a participant farmer from Taveuni: “I think the concept that I saw here is - it doesn’t have to be very huge. You can make do with almost nothing. It’s all about

Using the nursery as part of an off season production tool is very interesting so how you can get a head start on the weather, how you can get a head start on pest and diseases and in that case the nursery is a valuable tool

how you can create your own nursery, mixing your compost etc, instead of relying on the government for take outs. This place is showing all that. For me it’s about giving this knowledge back to farmers in Taveuni. I represent Taveuni Farmers Association. What we are concerned about is soil because we have done extensive dalo production for 30 plus years and its showing signs on the soil.”

“Our perspective is to look at the soil and try and get the farmers to do rotation of their planting. Make composts, doing different things to improve the soil. So it has been interesting viewing Sant’s methods,” Ekborn said.

This is my third year operating Bula Agro,” says Sant. “People have talked about difficulty of on season, off season but Fiji is blessed with the climate where you can produce things all throughout the year and the only thing is to develop a good seedling nursery and production system.”

“Now here at my farm I have 4-5 production systems, I do planting in pots, hydroponics, raised bed and trellising, different methods you can use during the rainy season to produce it. What you need is to put food on the table all throughout the seasons. I think we have to change our production system to meet the different climatic conditions.”

“I have a vision that Fiji’s fresh produce industry will continue to grow as a major contributor to the income of our farmers and to the nation of Fiji. I believe that in order to realise this vision we need to support our private nursery so that they can be better businesses and more adaptable to various natural disasters.”

Seed raising mix



Seed raising mix was one of the topics that came up during the field visit at Sant Kumar's Bula Agro Farm.

Seed raising is a gritty mixture of soil particles, organic material and fine drainage components. These are combined into a growing medium that allows adequate drainage, holds onto moisture and at the same time stays open so that delicate roots can move easily through it.

Potting mix has a larger proportion of organic material than seed raising mix. It holds onto more moisture and has higher nutrient levels to sustain developing young plants. It is fairly light and compacts down if handled too heavily. Particles are still fairly small so that young roots can easily find their way through it.

The regional farmers also viewed how Mr Sant sterilized his seed raising mix by using a drum.

One of the good points about sterilizing the seed raising mix is that it frees your crops from weeds and diseases

Some good materials for a seed raising mix include:

- Good river bank soil - supplies drainage, some water holding and some fertilizer.
- Well composted animal manure - supplies some fertilizer, particularly nitrogen and some water holding
- Well composted vegetable or garden waste - provides fertilizer like nitrogen and water holding
- Broken down coconut husks (grated) - provides water holding • Top soil under trees (free of debris) - provides fertilizer and water holding
- Seed raising mix from the shop - provides good drainage, enough water holding and may provide some fertilizer



Potting mix has a larger proportion of organic material than seed raising mix. It holds onto more moisture and has higher nutrient levels to sustain developing young plants.



Field Visit

Mun Sami Naiker



Mun Sami Naiker is a recipient of a project trialing high value crop seedlings using protective cropping structures engineered by the ACIAR/PARDI research team.

Situated in Matalavu, Tavua, the Director for All Season Nursery Director was on hand to show regional farmers his plastic tunnel and greenhouse structures where he grows his high value crops including capsicum, bongo chilies, cucumber, and zucchini. The farmer is a major supplier for vegetable seedlings in the Western Division.

"You can see the different major structures in terms of off season production that is in his disposal," Senior Fiji Agriculture Officer, Mausio Petero says.

"With his two plastic tunnels, he is able to do ploughing in the rainy season, there's no hindrance for his land preparation even though we have cyclones. The other structure which is the greenhouse - is for the winter months. These are usually for the production of the high value crops that does

not tolerate extensive heat so those high valued crops are planted in the green house."

As part of the Pacific Agribusiness Research for Development Initiative (PARDI) with funding from DAFF and the Australian Centre for International Agricultural Research (ACIAR) low-cost protective structures were researched and trialed in Fiji and Samoa

"The research began in 2013, first identifying a low-cost structure design, then setting up demonstration sites and more recently starting to validate crop growing systems that are likely to raise the production of high-value vegetables in the region and increase grower income," Project leader, Dr Elio Jovicich said in a report from Practical Hydroponics & Greenhouses

Through the ACIAR funding, and support from commercial company such as Fiji's Marco Polo International Ltd headed by Wah Sing, the protective structures were imported into



the country. The Ministry of Agriculture (MOA) were also involved in importing additional structures and irrigation components.

Mr Naiker and his Samoan counterpart Mr Edwin Tamasese, the Director of Soil Health Pacific Ltd were some of the few farmers that assisted with the trial of the seedling production.

"We have been experimenting with protected cropping and different type of growing systems for the plants under these structures," says Jovicich.

"Through the ACIAR/PARDI research project we're looking at protected crop systems that can be adopted in countries within the Pacific. In Fiji growers are now interested in off season crop production and also they are interested in minimizing the risks of losing production during the dry season.

"At these field visits we discussed with the participants on how to trellis different crops especially with capsicum

and tomatoes. Another big addition to this system is drip irrigation which is not very common here in Fiji. So we're also looking at different types of drip lines and their advantages and disadvantages.

Every farmer here is interested in these new technologies we have to adapt to the cost we can afford. So we are trying to look at the variety and range of technologies. Everybody is interested at the outcomes and the types of plants you can grow and the yields and quality that you can achieve."

Vegetable farmers in Fiji and Samoa have since been growing their first crops under these protected cropping and already seeing first-hand the increases in yield and produce quality.

"The difference I saw is the size of my capsicum which has doubled in size. With only three of my capsicum it makes one kg," says Mun Sami. "I have in my disposal healthy seedlings especially for off season crop production."

Feedback

Lilian Ekbom
Teitei Taveuni

For me it's about taking this information back to our farmers in Taveuni. What we are concerned about is soil. In Taveuni we have done extensive dalo production for 30 plus years and it starts to show signs on the soil. And people start to abandon their farms because they can't get their yield, there's a lot of rejects. Farmers are having to go further out plant in the mountains. However they can adopt new methods like doing rotations in planting their crops, making composts etc. Visiting Sant Kumar's farm was interesting. The concept was that it doesn't have to be very huge, with a little bit of invention you can do anything from nothing. It's all about how you can do your own compost mixing, how you can create your nursery. You don't have to depend on the government.

Barry Skature
Vanuatu Farm Support Association

The workshop has been an eye-opener for me especially on protective agriculture and how we're moving towards commercial production especially for us Pacific Islanders we have to take bold steps forward and study these protective cropping structures. As we've seen difference with the vegetables grown out in the field and how the vegetables adapt within the green house structures. I believe for us Pacific Islanders this is the way to go to modernize our techniques on the way we plant our vegetables and the proper way to go about it. Adopting protective agriculture is the way to go, though it may be expensive getting the structures done but commercially in the long run it's viable.



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Field Visit

Nadarivatu



On the last day of the workshop, the participants travelled to the breathtaking peaks of Nadarivatu which was a highlight for some.

Located three hours' drive west of Suva, the Navai-Nadrara production area which the participants visited is located about 830 m above sea level and the temperatures are distinctly cooler than the lowlands (Mean annual temperature of 20 °C rising to 22 °C in February and falling to 18 °C in July)

"The purpose of visiting Nadarivatu was to witness the ideal environment for off season vegetable production," Project Field Coordinator for Partnership in High Value Agriculture (PHV) Nemani Susu says.

Nemanis's PHVA Project is funded by the International Fund for Agricultural Development (IFAD). It is implemented in Fiji by Partners in Community Development Fiji (PCDF) and the Fijian Government through the Department of Agriculture, which plays an advisory role.

The aim of the project was to assist small scale producers engaged in sustainable farming and business partnerships in remote areas particularly the highlands of Viti Levu. As well as enable small holder farmers to meet the demand for high value crops and other agricultural products.

Speaking to the participants, Nemani says the project's objective is to reduce poverty within the areas of Nadarivatu which consist of 13 villages and 7 settlements.

"The reason for participants to come here was to look at the methods adopted by the Navai farmers and people from Papua New Guinea can do the same especially with the same altitude," he adds.

"Even if we are into the main season for vegetable production, in Nadarivatu the climatic condition is the same all year round. It is the only land here in Fiji which can produce vegetables on the field for both the on season and off season."



The purpose of visiting Nadarivatu was to witness the ideal environment for off season vegetable production

Nemani adds that farmers in Nadarivatu do not maximize their production during the main season which is April to September because they will lose out due to the low prices of their vegetables.

The Nadarivatu farmers normally supply tomatoes all season however under the new PHV Project, the farmers are learning how to grow cauliflower, capsicum, cabbages and broccoli, egg plants and chilies.

"We have 3 major agriculture projects here," says Nemani. "First is our project funded by IFAD implemented in partnership with community development Fiji, the second project is organized by the Taiwan Technical Mission and the third project for Nadarivatu is the government funded Nadarivatu Development Program. This is a government funded project through the Ministry of Agriculture."

During a baseline survey carried out in 2012 the population of Nadarivatu farmers stood at 2013 in areas covering 3 districts

in the three province. These are Savatu district in Ba, Nadrau district which comes under the Nadroga/Navosa and the village of Navai which comes under the province of Naitasiri.

The PHV Project was a recipient of a US\$500,000 funding from IFAD (International Fund for Agriculture Development) in 2013.

Early this year the Minister for Agriculture, Rural and Maritime and National Disaster, Hon Inia Seruiratu successfully negotiated a further funding of US\$6m to fund the Fiji Agricultural Partnership Project (FAPP) with the International Fund for Agricultural Development (IFAD).

Since 1980, IFAD has provided US\$100m to the Pacific in grants and low-interest loans to projects. IFAD is an international financial institution and a specialized United Nations agency based in Rome – the UN's food and agriculture hub.

Background on the PIFON-SPC Partnership

The regional farmer training on protective crop technologies is the result of the partnership agreement between the Pacific Farmers Organisation Network (PIFON) and the Pacific Agriculture Policy Project (PAPP), which comes under the Secretariat of the Pacific Community's (SPC) Land Resources Division.

The Pacific Island Farmers' Organisation (PIFON) is an umbrella organization that represents 19 farmer groups across the Pacific and serves as an umbrella organisation for national Farmer Organisations (FOs), to coordinate capacity building, share success stories and the lessons learnt, support regional exchanges of expertise between FOs and their associated private sector and donor agency partners.

Under the two year partnership agreement which ends December 2016, the PAPP program enables PIFON to address the development needs of small holder farmers and assist them in adopting new technologies to improve farming techniques.

The agriculture sector is one of the underutilized sectors in the Pacific yet 80% of the Pacific population depend on it as their major source of livelihood and for food and security. According to research the major threat of the Pacific's dependence on imported foods has resulted in smallholder agriculture farms unable to supply and satisfy the needs of its local markets.

With this in view the European Union funded PAPP project which is part of the EDF 10 Intra ACP Agriculture

Policy Programme - will work with farmer associations in the adoption of new farming methods to improve their agricultural productivity, and increase their resilience against the effects of climate change

PAPP operates in the Pacific ACPs (Cook Islands, Fiji, Kiribati, Marshall Islands, Federated States of Micronesia, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu), and Timor Leste. It is implemented by the Land Resources Division (LRD) of the Secretariat of the Pacific Commission (SPC).

The project will work with farmer associations to assist in the adoption of new farming methods and improve their agricultural productivity.

Some of the objectives of the PIFON-PAPP project include:

- Supporting regional exchanges of expertise between farmer organisations and private sector partnerships;
- Collaboration with Pacific country extension services, national farmer organisations and organic producers on promoting sustainable agricultural practices;
- Strengthening the sustainability of national farmer organisations; and,
- Establishing a help desk for questions on commercial agriculture.

Acronyms

FFS	Farmer Field School
IFAD	International Fund for Agricultural Development
ACIAR	Australian Centre for International Agricultural Research
SPC	Secretariat of the Pacific Community
PARDI	Pacific Agribusiness Research for Development Initiative
PGS	Participant Guarantee System
PHVA	Partnership in High Value Agriculture
TTM	Taiwan Technical Mission
AVRDC	Asian Vegetable Research and Development Center
PIFON	Pacific Islands Farmers Organization Network



PIFON



SPC
Secretariat
of the Pacific
Community



Australian Government
Australian Centre for
International Agricultural Research



EUROPEAN UNION

PAPP
Pacific Agriculture Policy Program



