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1. Entomology Attachment Training for Pacific Islanders

A goal that is eagerly pursued by Plant Protection Section is capacity building of Pacific island researchers in the broad area of plant protection. This activity entails identifying promising research staff and giving them intensive short-term attachments in plant protection work.

In June and July two Pacific island entomologists received training when they came for short-term attachment work at PPS. Mr. Aleni Uelese and Ms. Siutoni Tupou, entomology trainees from Samoa and Tonga respectively, were invited to spend some time observing and conducting hands-on training with PPS

Entomology Section. Ms. Tupou arrived in June and Mr. Uelese in July. Subject areas covered include laboratory insect rearing, insect identification (collection, preservation, etc.); field survey, collection and monitoring of insect pests and their natural enemies; participate in rhinoceros beetle extension awareness activities and meetings with PPS technical staff.

Ms. Tupou travelled with PPS Entomology staff to Taveuni and Savusavu to participate in farmer field days on rhinoceros beetle awareness while Mr. Uelese travelled to the major research stations around Viti Levu observing Fiji plant protection activities.

2. Solomon Island Electronic Library Project

Mr. Fred Peters newly appointed Information Officer and charged with managing the new Electronic Library Project (ELP) for the Ministry of Agriculture and Livestock (MAL), visited PPS in July. He reported progress work on ELP especially with email set-up of nine MAL staff and the acquisition of their own domain name. This project is now progressing well after it was handed over by SPC Director General Ms. Lourdes Pangelinan at the end of May. SPC and PPS funds are helping re-establish library and information services for MAL. Mr. Peters met with the PPS technical staff while transiting through Suva to Kiribati to attend the IRETA Information Meeting. He spent some time with the library staff and also polished up on his IT skills while at SPC.

Mr. Peters will next work on scanning and digitising documents and using the Greenstone cataloguing software. Mr. Peters said that he would shortly have an assistant to help with information work.

3. Rust-resistant coffee

A spontaneous hybrid of robusta and arabica coffee plants has been discovered in New Caledonia in the western Pacific. It is noted for its strength of taste, fertility and resistance to the *Hemileia vastatrix* rust. Coffee cultivation started in New Caledonia in 1878, but was abandoned because of a failing economy and the sensitivity of arabica plants to rust. The plantation areas lived on, however, and the two species *Coffea canephora* (which provides robusta coffee, resistant to rust) and *Coffea arabica* jointly developed a spontaneous hybrid.

The old plantations thus took on a second lease of life as a center for natural plant diversification.

The French development research institute IRD has conducted several prospecting campaigns to seek out these resistant hybrids, renowned also for their productivity and quality. The most interesting find so far has been a hybrid quite similar to the *Laurina* species (also known as Le Roy or the Pointed Bourbon), which is an arabica with a high quality taste and aroma, and low in caffeine. It is resistant to rust and, unlike some other hybrids, has a good yield.

At present, the IRD is studying 2,500 young plants, which have been collected with the agreement of the authorities in the southern province of New Caledonia. In the long term, they could serve to improve the taste of other varieties and to combat rust.

For more information contact Daniel Le Pierres: lepierre@mpl.ird.fr

4. Chromolaena biocontrol and Snail Research in Micronesia

Konrad Englberger – Coordinator, Plant Protection Micronesia (PPM)

PPM and University of Guam are working together on the biological control of chromolaena weed.

Pareuchaetes pseudoinsulata and *Cecidochares connexa* (gall fly) are the two identified biocontrol agents for *Chromolaena odorata*.

P. pseudoinsulata is present in two of the FSM states and needs to be mass reared in Pohnpei and released in Chuuk and Yap where it is not present. *C. connexa* is present in Palau and Guam and it is planned to be introduced to all four FSM States. For *C. connexa* host specificity testing needs to be done for yam and kava. During the last six months *P. pseudoinsulata* eggs (9,000) and larva (1,250) were sent to Chuuk for release. Yam and kava plants were planted for host specificity testing and two new quarantine rooms were renovated and prepared for *C. connexa* rearing. The first shipment of *C. connexa* arrived from Guam and is under quarantine for host-specificity testing.

In the first week of August the PPM Coordinator will be in Palau to organise the seminar "Technology Transfer of Biological Control of Papaya Mealybug" conducted by Dr. Dale Meyerdirk, USDA APHIS. At

the same time Dr. Meyerdirk and his team including Dr. Muniappan will survey the papaya mealybug damage and study release sites for the new parasites, which will be brought in from Puerto Rico.

On other plant protection activities PPM Coordinator is actively involved in a survey on slugs and snails on commercial and garden crops in the islands of the American Pacific. Project coordinators include Dr. Robert Hollingsworth, USDA, Hilo, Hawaii and Dr. David Robinson, USDA Academy of Natural Sciences, Philadelphia.

As background to this new research, slugs and snails are important agricultural pests, and certain species are quarantine pests representing a potential constraint on the exports of U.S. specialty crops. As a by-product of commercial and military shipping, slug and snail pests can be spread from Pacific islands to Hawaii and the mainland U.S.A., causing selected export markets to be disrupted until adequate control and inspection measures can be put into place. In addition, potential exports from U.S. territories are at risk due to the spread of slugs and snail pests within the Pacific region. Pest species of slugs and snails in Pacific islands are exotic in origin, having been accidentally introduced on agricultural commodities and other cargo. Distributions of these quarantine pests in the Pacific region are poorly known. This situation reflects both the difficulty in identifying similar-looking species and a lack of awareness regarding the diversity and importance of these easily overlooked organisms.

With the assistance of local scientists, the project will collect slug and snail pests from agricultural sites on the major islands of American Samoa, the Federated States of Micronesia, Guam and the Northern Mariana Islands. Host plants and pest densities will be recorded. Slugs and snails will be identified using morphological techniques and DNA analysis (as necessary). The authors will produce a colour manual containing information about the identification, biology, distribution and pest status of the important slug and snail pests present in the region. This manual will be used to train quarantine and extension personnel stationed in the islands covered by the survey.

Information about the identification, distribution, host preferences and pest status of these pests is needed to prevent their further spread, and in planning eradication programs. This information will benefit islands in the American Pacific because it will provide local quarantine inspectors with the tools and motivation necessary for excluding or eradicating important snail and slug pests. The information will benefit the United States because Hawaii and California have direct air links with islands in the American Pacific, and knowledge about the distributions, pest status and host preferences of important snail and slug pests will result in increased vigilance and a more effective application of existing quarantine laws.

5. Lucid Taxonomic Keys developed for *B. dorsalis* complex

Naca Waqa – PPS Fruit Fly Technician

Introducing the Lucid Taxonomic Keys used to identify the more than 70 species of *Bactrocera dorsalis* fruit fly complex was the main objective of two research scientists from Queensland University of Technology visiting Plant Protection Service recently.

Tony Clarke, Entomology Lecturer and Amy Carmichael, Research Assistant gave a presentation on the Lucid Taxonomic Keys that they and other experts had developed for the identification of *Bactrocera dorsalis* complex. The aim of their visit was to extend the use to developing lucid keys for other quarantine insect pests and weeds. The trip was also to introduce the lucid keys to ministries and organisations that may use the tool for preliminary identifications.

The two scientists met with some SPC Land Resource Division staff, Ministry of Agriculture Plant Protection and Quarantine and Ministry of Forestry staff. A seminar was also organized during their visit.

6. Pacific Island Quarantine Operations Training

Sidney Suma – PPS Biosecurity Officer

Three quarantine officers, two from Kiribati and one from Tuvalu, received training in quarantine operations when they spend two-weeks with the Fiji Quarantine and Inspection Division (FQID). The three received training in the areas: aircraft and passenger clearance, cargo inspection and clearance, aircraft dis-insection, vessel clearance, garbage disposal, export commodity inspection and certification. The trainees were also supplied with inspection kits, which contained a torch, hand lens and pocket-knife.

The Pacific Island Quarantine Officers successfully completed the capacity-building exercise and their efforts were duly recognised in a short ceremony where they received their Certificates of Achievement from

Dr. Ken Cokanasiga –Deputy Permanent Secretary, Ministry of Commerce, Business Development and Investment. PPS facilitated this capacity building exercise with funding support provided by the EU. PPS acknowledges the support by the Quarantine and Inspection Division of the Fiji Ministry of Agriculture, Sugar and Land Resources for their overall supervision of the trainees. The Quarantine Officers are Mr. Bitaa Rameka and Mr. Burangke Tabeibeti from Kiribati and Mr. Mataio Lonolona of Tuvalu.

In a similar capacity building exercise on quarantine operations in the lead up to the South Pacific Games Fiji Quarantine hired extra help to cope with increased quarantine operations. The new recruits received induction training to qualify them in their new quarantine roles. The temporary officers were sourced from within the Ministry of Agriculture, Sugar and Land Resettlement. Mr. Nacanieli Waqa, technical assistant with the Fruit Fly Management team and senior officers from FQID conducted the one-day assistance.

The training was funded by the Pacific Plant Protection Service of the Secretariat of the Pacific Community from its current project on Plant Protection in the Pacific and Fiji Ministry of Agriculture, Sugar and Land Resettlement.

7. Kava Dieback Research Activities

Dr. Richard Davis – PPS Virologist

Kava dieback disease is by far the greatest production problem for kava growers in many Pacific Islands. It is especially important to Fiji, where it was first described on the Suva Peninsula in the 1930s, and regularly causes crop losses of up to 60 percent over large areas. Although it is often less severe in other Pacific Island countries, dieback is still a persistent problem for kava growers elsewhere.

A causal relationship between *cucumber mosaic virus* (CMV) and kava dieback has been clearly demonstrated, but some variability was evident in these studies suggesting CMV may be interacting with some other factor when it causes dieback in kava. Since that time, vast technological advances have been made in the field of plant pathology, especially in the use of the tools of molecular biology to study plant-infecting viruses. These new techniques may help us to answer the remaining questions about kava dieback. Staff of Fiji MASLR Plant Pathology laboratory - Mereia Fong, Sarlesh Kumar and Una Turaganivalu together with Richard Davis and Takaniko Ruabete of PPS has started on a long-term programme to do this. First steps has been to start an ongoing study in the local area to: 1) determine if CMV is interacting with some other pathogen to cause dieback, 2) determine if there is important variation in the strains of CMV involved in dieback in this region.

The strategy will involve collection and preservation of leaf samples from a range of different disease situations, followed by close monitoring of subsequent disease development, recovery or survival. After the full story of what happened to individual kava plants over the following weeks and months is known, suitable comparative leaf samples will be selected from those collected and sent to overseas labs for in depth diagnostic testing, using the tools of molecular biology and electron microscopy. Later, some of the molecular work will also be conducted in the new laboratory at USP's Institute of Applied Science.

The joint PPS/MASLR kava dieback team has also recently planted a field trial at Doboilevu Research Station near Rakiraki, with planting material purchased from apparently disease free farms at Waibau, near Suva. The aim of this trial is to test for the first time, simple cultural control options that growers may be able to use to manage the disease.

A policy of regularly examining crops for first symptoms, and removing diseased plants as soon as they are discovered will be compared with the effects of removing only infected stems as soon as they are discovered. Another trial located in an area with a high incidence of dieback disease, somewhere closer to Suva, will be planted later in the year.

8. Vanuatu Disease Survey

Dr Jacqui Wright – Plant Pathology Coordinator

Vanuatu Quarantine and Inspection service (VQIS) requested assistance from PPS plant pathology to conduct a survey of various islands in Vanuatu. Six islands in Vanuatu were included (2 islands were missed due to Cyclone Gina) where both commercial and subsistence farms were visited. The VQIS team: Merriam Seth, Sylverio Bule, Linette Beru and Apete Junior and the PPS plant pathology team scaled mountains and waded through mud to collect 177 fungal samples, 130 virus/phytoplasma samples and 40 nematode samples. These have all been entered into the Vanuatu Pest List Database, which now holds 2,947

national pest occurrence records. Samples have been sent to various taxonomic experts for identification. As no formal virus and phytoplasma survey has ever been done in Vanuatu, the results of the virus sampling will be most interesting.

The survey was also used as means to train the VQIS officers in disease specimen collection and preparation techniques. The officers gave excellent support to the PPS team, quite often staying late in the evening processing samples. A staff member of the Office of the Chief Plant Protection Officer, Eli Szandala, accompanied the team as a trainee through an AFFA Development Award. The survey was extremely successful due to the co-operation of the VQIS team and local extension officers from the Department of Agriculture & Rural Development. The PPS plant pathology team thank VQIS staff members, local extension officers and the growers for their excellent assistance during the survey.

9. An overview of Plant Nematode Problems for Vanuatu

Takaniko Ruabete – PPS Plant Pathology Technician

There is a great need to upgrade the Vanuatu nematode record. The present one was found to contain insufficient information to adequately be used as a tool for Pest Risk Assessment for trading purposes and local crop management. The existing database shows only three species with host plants. The remaining 17 species were without plant hosts.

One would expect to find more plant parasitic nematodes in Vanuatu, similar to Micronesian and Polynesian countries, but nematodes have not been a major problem because of the type of cultivation system practiced by the local farmers or villagers – shifting cultivation and land fallowing. This is ideal nematode management system with the advantage of suppressing populations by denying food to the nematodes. A disadvantage with the system is the risk of the spread of plant parasitic nematodes via the movement of plant material and soil.

The Vanuatu disease survey carried out in June has shown that the threat of nematode problems will come from Efate and Santo – the two islands where most export crops are farmed. Most of these farms are foreign own and therefore have limited farmland. Farming is intensive on these soils creating ideal conditions for the build-up of nematode populations. There were instances of this problem recorded on several prominent farms on the two islands. It is expected that more farms will be affected in the coming years because many nematodes are multi-host plant parasites.

Another disadvantage with the traditional gardening system is the continuous farming of long and medium term crops such as kava, coffee, citrus, banana etc. This practise increases food supplies and encourages the build-up of crop specific nematode pests.

Kava nematodes:

Kava is probably the only cultivated crop that is not rotated much and remains in the same field longer than others like yams, sweet potato, taro etc. During the Vanuatu disease survey symptoms of rootknot nematode were observed on farms from the coast to the highlands. This suggests that the rootknot nematode species attacking kava is well distributed in the kava growing areas. This may have been the result of the movement of diseased planting material and soil over the years through shifting cultivation.

Severity of nematode damage was not ascertained however, the most severe damage to a single plant was observed at Epule Hill Top in north Efate, Lovunmataiboe in Ambae and at a community farm in Fanafo, Santo. The plants observed here have wilted with the roots and basal area heavily covered with rootknots. Several kava root specimens were collected from these areas and fixed for identification.

Banana nematodes:

Banana is in the same situation as kava. There were a lot fallen bananas infected with nematodes observed in many places. These plants fell over quite easily for three main reasons: (1) very poor root system due to heavy nematode infestation, (2) most of the standing plants were just sitting on the ground and were not planted deep enough, (3) a lot of corm borer damage.

Poor weather conditions prevented the survey team travelling to Pentecost and Gaua in the Banks group. The Banks group could have been one of the strategic places to survey because it is closer to the Solomon Islands and it is possible over the years that many planting materials were exchanged between the two locations.

Heavy rains and very wet soils prevented the survey team from extracting more soil samples. Wet soils are not ideal conditions to extract nematodes from for two reasons: 1) many of the nematodes would have died in water-logged conditions long before extraction, 2) the nematode suspension will be too dirty to clearly

observe the nematodes and many would have been lost through successive sieving to clear the suspension, particularly in the field extraction technique used in this survey.

10. Samoa Rhino Beetle Media Awareness, 10-12 June 2003

Emil Adams – PPS Publications Officer

Surveys on Savaii and Upolu conducted earlier this year by SPC Technical Staff together with the help of the entomology team of Samoa Ministry of Agriculture, Forest, Fisheries and Meteorology (MAFF&M) pointed to an alarming increase in rhinoceros beetle damage to coconut plantations. Many village communities now regard coconut farming as low priority activity owing to low copra prices and the perceived poor image associated with copra production. Subsequently, villages have neglected to upkeep their coconut plantations. However, many acres of communal land are still under coconut – a legacy left behind from colonial times – and the coconut remains the most versatile crop in Samoa and other Pacific islands. Neglected coconut plantations create ideal breeding grounds for the rhinoceros beetle to lay eggs. Farmers cutting down coconut trees to make way for other cash crops or commercial loggers cutting down coconuts to make coconut furniture, have not followed recommended steps to properly dispose of coconut logs which translate to more rotting material lying around. The problem is further compounded by excessive amounts of sawdust left behind by commercial loggers cutting down forest trees in rural areas. The huge piles of sawdust have become excellent breeding places for the rhinoceros adult beetle.

The coconut is still one of the most important crops in the Pacific. Many livelihoods in rural areas depend on this crop for food, shelter and to make value-added products such as coconut jewellery. Coconut oil produced more efficiently and faster from village-based micro-exPELLERS becomes an employment opportunity for many women in rural areas. Coconuts are exported green or brown, as desiccated coconut, as coconut oil or coconut cream and are used in many Pacific culinary delights. Coconut furniture is a high-end business venture. These are some of the socio-cultural and economic reasons why the coconut will always remain a viable crop for the Pacific islands and which is why coconut production should continue to maintain at a high level. Rhinoceros beetle, and other coconut pests, have a negative impact on coconut production.

The rhinoceros beetle was successfully brought under control in the Pacific in the 60's and 70's through a very active and strict cultural and biological control regime. Island governments passed legislation to enforce control measures and fined families who don't follow the recommended control measures. However, falling prices and the lure of other fast cash crops have resulted in neglected coconut plantations.

Thus the Samoa rhinoceros media awareness campaign revisited and strengthened previously successful control measures through public education and involving local communities in the control of the rhinoceros beetle.

An intensive 3-day media campaign involving radio, TV and newspaper was launched in the second week of June. Thirty-eight 1-minute radio spots were broadcast on all three commercial FM stations. The three commercial stations combined covers 90 percent of the population living on the two main islands. On the third day a 1-hour talk back on 'Talofa FM', the all-Samoan and most listened radio station, discussed the rhinoceros beetle problem with Entomologist Fuifatu Pili Enosa before fielding questions from callers. The only daily and two weekly newspapers ran press releases highlighting the problem. The local TV news ran a story on the campaign with fresh footage of rhino damaged plantations. They also featured interviews by both the entomologist and PPS Information Officer. The once-weekly half-hour TV documentary - 'Atina'e Samoa' – focusing on rural development issues ran a special programme on the campaign. The documentary video will now be used as a training resource on rhino beetle control. As well a poster prepared by PPS and in collaboration with Samoa MAFF&M on rhinoceros beetle was also distributed to schools and the media. Secondary schools were involved in an essay competition. Students in year's 12 and 13 in seven secondary schools in the vicinity of Apia were visited and invited to submit 250-word essays on the importance of controlling rhinoceros beetle on coconuts. This activity involved the Ministry of Education through the Agricultural Curriculum Unit. The best essays collected prize money with consolation prizes being hybrid coconuts.

Entomology and extension staffs were planning localised awareness activities when they travel to meet with village communities in worst affected areas in both Upolu and Savaii.

The Director of MAFF&M Seumanutafa Asua Malaki Iakopo is acknowledged for his help in allowing this PPS activity to be carried out, So'oalo Albert Peters for facilitating the activity with Nu'u rhinoceros beetle

team, Entomologist Fuifatu Pili Enosa for completing all the planned activities, Ms. Emele Meleisea and assistant for initial planning work and Mr. Gauna Wong of the Agricultural Curriculum Unit for coordinating the essay competition. PPS is acknowledged for funds to carry out the campaign.

11. *Phellinus noxius* – brown root disease

Dr. Jacqui Wright – PPS Plant Pathology Coordinator

Phellinus noxius is a fungal disease that affects over 50 plant genera and has been recorded from most of the countries in the Pacific. It has caused devastation in a number of different situations such as cacao plantation and breadfruit plantings (Brooks, 2001).

http://www2.ctahr.hawaii.edu/adap2/ascc_landgrant/Dr_Brooks/TechRepNo.37.pdf). It rarely is mentioned as a big problem although the history of this disease may suggest otherwise. It is becoming of particular concern to various countries that are growing second rotation mahogany plantings and also for the various sandalwood species and their host trees.

A group from the Taiwan Agricultural Research Institute has produced various research papers on integrated control of *Phellinus noxius* and they suggest: “Flooding is very effective in killing the fungus in root debris in the soil. Urea, calcium carbonate and some synthetic fungicides also showed high efficiency in suppressing the disease in the field. *P. noxius* can not grow at pH > 7.5. Calcium carbonate is generally used as a liming agent, whereas urea has both effects in raising soil pH and generating ammonia for killing the pathogen. However, the disease suppression mechanisms of the integrated control measures remain to be investigated.” (Pao-Jen Ann, Jyh-Nong Tsai, Ien-Ting Wong, and Shiou-Hua Huang, 2003

<http://www.forestresearch.co.nz/PDF/09.24Annetal.pdf>)

I would be interested to hear from anyone who is experiencing difficulties with this fungus and also of any potential control methods you have tried. If anyone has done trials on tolerance/resistance of various tree species to this disease, if you could share your experiences it would greatly appreciated. You can contact me: jacquiw@spc.int

12. Review of GTZ/SPC Bio-control Projects in Pacific region

A senior specialist scientist from the Pretoria-based Plant Protection Research Institute, Dr. Rami Kfir, is presently visiting PPS as a consultant to review the GTZ/SPC Biological Control Project. He will focus mainly on IPM programmes with cabbage pests. Dr. Kfir will work closely with SPC Entomologist Mr. Sada N Lal on the biological control of diamondback moth and large cabbage moth in the Pacific. In this regard Dr. Kfir will be visiting Cook Islands, French Polynesia, New Caledonia, Samoa, Tonga and Vanuatu and will conduct the following activities: field survey of cabbage pests and their natural enemies, meet with national plant protection staff, assess available facilities and staff capabilities to carry out biological control work, collect climatic data to match with natural enemies for future introductions and present seminars on biological control. He will prepare a report on the country visits and make recommendations for future work in the Pacific on biological control of cabbage pests.

13. Completed PPS activities in PICTs

PPS Staff	Dates	PICT Activity
Sada L Nand Stephen Hazelman Bal Swamy	30 May -16 June	Niue: follow -up on IPM 2002 activities; survey fruit piercing moth, mealybugs and scales and their natural enemies
Dick Vernon	7-15 June	French Polynesia: provide digital camera to Department de la Protection des Vegetaux (DPV) to assist with pest id and quarantine operations; upgrade the Pest List Database
Dick Vernon	15-21 June	Cook Islands: upgrade the Pest List Database
Fereti Atu	22-25 June	Vanuatu: taro beetle management work: 2 nd application of Metarhizium, put up fence around perimeter of trial block, take photos of taro trial.
Sada L. Nand Stephen Hazelman	1-10 July	Taveuni and Savusavu: rhino beetle extension activities

Fereti Atu		
Salend Kumar Nilesh Prasad	19-30 July	Tuvalu: PRA and extension materials training
Konrad Englbürger	7-12 July	Kosrae: quarantine and general plant protection activities
Dick Vernon & Makelesi Kora- Gonelevu	23 July	Fiji Islands: review operation of the Quarantine Interceptions Database during the period of the South Pacific Games

14.PPS Staff travel calendar

Dates	Country	Staff	Activity
19-30 July	Tonga	Warea Orapa	Weed management planning
26-31 July	Yap	Konrad Englbürger	Plant protection and quarantine activities
1-8 August	Palau	Konrad Englbürger	Plant protection and quarantine activities
1-8 August	New Caledonia	Richard Vernon, Makelesi Kora-Gonelevu	Introduce the New Caledonia Pest List Database
2 – 9 August	French Polynesia	Sada N Lal	Biocontrol of cabbage pests
10-16 August	Malaysia	Richard Davis	Citrus greening diagnostics workshop
8 -18 August	Kiribati	Steve Hazelman	Butaritari breadfruit trial
17-31 August	PNG	Warea Orapa	Weed bio-control training
19-21 August	Nauru	Mick Lloyd	Plant Protection activities
19-25 August	Nauru	Steve Hazelman	PRA
23-27 August	French Polynesia	Emil C Adams	Country visité
23-28 August	French Polynesia	Sidney Suma	Quarantine issues
30 August-12 September	French Polynesia via Cook Islands	Ema Tora Vueti	Fruit Fly Eradication Program

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