REPORT

TRIPARTITE REVIEW OF REGIONAL PROJECT

ENHANCEMENT OF PRODUCTION AND EXPORT OF FRESH FRUITS BY CONTROLLING FRUIT FLIES IN THE SOUTH PACIFIC
(Short Title: Regional Fruit Fly Project (RFFP))

(Reference - RAS/93/300 : Report No. 15)

Compiled by :
Allan Allwood

Chief Technical Adviser	26 April, 1995

CONTENTS

INTRODUCTION

The regional activities on fruit flies and their control commenced in September, 1990, under the auspices of the FAO Technical Co-operation Programme, TCP/RAS/0055 (September, 1990 - September 1991). This initiative was supported by a second component to the first phase of the project from January, 1991 to June, 1993, namely RAS/90/004. Funds for this component were provided by the Australian International Development Assistance Bureau (AIDAB), United Nations Development Programme (UNDP) and the South Pacific Commission (SPC). These projects operated in Cook Islands, Fiji, Tonga and Western Samoa under the execution of SPC's Agriculture Programme and the implementation of FAO, in conjunction with the Governments of each country.

RAS/90/004 was reviewed by external reviewers in July, 1993, concurrently with a parallel regional project on fruit flies, funded by the Australian Centre for International Agricultural Research (ACIAR). The review report found that the project had made significant progress in understanding and managing fruit flies in the project countries and that the technical capacity of project countries had been improved considerably. The review supported the need to consolidate the advances made in the project countries and expand its activities into Federated States of Micronesia (FSM), Solomon Islands and Vanuatu.

To ensure continued impetus of the technical achievements and to finalise a project document for the extension and expansion of project activities, FAO, through TCP/RAS/2360, funded the continuation of the project activities from July, 1993 to January, 1994.

The Project Document for this second phase of the Regional Fruit Fly Project (RFFP) was signed on 10 January, 1994. The budget for the 3 year project is US$1,016,700, made up of US$680,000 from AIDAB and US$336,700 from UNDP. The project's funding operates under a cost-sharing agreement between UNDP and the Australian Government. Again, the project is executed by SPC and is implemented by FAO, in conjunction with the Governments.

As well as funds from the Australian Government and UNDP, US$125,000 is provided for 3 years by the New Zealand Government through SPC for fruit fly activities. These funds provide the Ministry of Agriculture, Fisheries and Forests (MAFF), Fiji, with a graduate trainee and technician, supplement laboratory equipment for heat tolerance research in Western Samoa, Vanuatu, Solomon Islands and FSM and provide for additional regional quarantine training, particularly for attachment training in New Zealand.

SPC has signed a Memorandum of Understanding (MOU) with the Agricultural Experiment Station/College of Micronesia (AES/COM) and the FSM Government for matching funds provided by USDA for specific fruit fly activities in FSM. This amounts to US$101,400 from AES/COM and US$30,300 from the FSM Government for the period of the project.

PROJECT IMPLEMENTATION

During 1994, the RFFP continued to operate in Cook Islands, Fiji, Tonga and Western Samoa. Fewer visits by the Chief Technical Adviser (CTA) were made to these countries than in previous years and this was in line with the progressive devolution of responsibilities for project activities to the Governments. All visits were for the purpose of assessing progress and providing technical advice, and generally corresponded with major training workshops. Tonga and Western Samoa still have technical assistance through the location of a United Nations Volunteer (UNV) in each country. However, this assistance will cease in the last quarter of 1995. Fiji and Cook Islands have sufficient, adequately trained personnel to carry out the activities of the project, under guidance by the CTA, so UNVs are no longer located in these countries.

The project commenced in Vanuatu in January, 1995 with the transfer of a UNV, experienced in fruit fly research, from Cook Islands.

Unfortunately, unlike Vanuatu, the implementation of the project in Solomon Islands and FSM was delayed considerably because the recruitment of UNVs took more time than expected. Recruitment was done through the UNV system in Geneva and under a cooperating agency arrangement with the Overseas Service Bureau in Australia. As funding for the UNVs was provided by AIDAB, every effort was made to recruit UNVs from Australia. Despite starting the recruitment process in October, 1993, the UNV for Solomon Islands from Australia took up post in Honiara only in May, 1994. The UNV's exposure to malarial mosquitoes due to less than satisfactory accommodation provided by the Government and inadequate self-protection resulted in his contracting chronic malaria and having to be medically evacuated to Australia in September. He returned to Solomon Islands in November, 1994 and has not had malaria since his return.

Unfortunately, an impasse between the UNV and some staff in the Research Division resulted in a request by the Ministry of Agriculture and Fisheries (MAF) to replace the UNV. Following negotiations between SPC, CTA and MAF, consideration is being given to operating the project through a National Co-ordinating Committee, with the National Project Co-ordinator being the Under Secretary (Agriculture). The existing UNV was terminated on 13 April, 1995. The project's progress was satisfactory, considering the difficulties that had occurred. The UNV will be replaced if the proposed new framework is agreed to and implemented.

It was not possible to recruit another suitable UNV from Australia for FSM so UNV (Geneva) identified a UNV from Canada. The UNV took up duties in Pohnpei in late November, 1994.

Much of the basic equipment and supplies for the new countries have been provided and functional laboratories have been established in Vanuatu and Solomon Islands. Under the MOU in FSM, the Land Grant Program are to provide a laboratory at Palikir. In the meantime, two temporary laboratories have been set up at the Agricultural Experiment Station in Kolonia.

Cheap, regular communication is essential to effective implementation of the regional project. To this end, the RFFP's use of the PEACESAT "FLYNET" sessions every month has assisted enormously the implementation of the project and the exchange of information between project and national staff in the 7 project countries. The technical content of the sessions is being enhanced by increasing the session by 30 minutes and using this time for two 15 minute presentations of technical results on particular activities of the project by the countries. Also, arrangements are being made for staff working on developing heat tolerance data for quarantine treatments in Tonga, Fiji and possibly Western Samoa, to speak with Dr. Jack Armstrong of the USDA Hilo Laboratories (Hawaii) and the USAID Commercial Agricultural Development (CAD) Project, using PEACESAT.

DEVELOPMENT OBJECTIVE, IMMEDIATE OBJECTIVES AND OUTPUTS

Development Objective

The Development Objective is to increase the level of production and quality of fresh fruits and fleshy vegetables, leading to enhanced availability for local consumption, increased exports and higher farmers' incomes in Cook Islands, Fiji, Tonga, Western Samoa, Solomon Islands, Vanuatu and Federated States of Micronesia.

Immediate Objective 1

To upgrade the technical knowledge and understanding of the impact of fruit flies on production and export of fresh fruits and fleshy vegetables by plant protection, quarantine, extension services staff and the private sector.

Expected Outputs

1. Updated, valid information on the fruit fly species present in the 7 countries, their seasonal abundances, geographical distributions, host ranges, parasitoid prevalence, levels of parasitism, and stages of maturity at which fruits or vegetables become susceptible to fruit fly infestation.

2. Data on the levels of damage and, hence, clarification of the economic significance of fruit flies to production.

3. A quarantine surveillance system in each country based on trapping and host surveys to monitor fruit fly populations and host ranges for existing species and to survey for the introduction of exotic species of fruit flies. (By the end of 1995, the Governments of Cook Islands, Fiji, Tonga and Western Samoa are to assume operational and financial responsibility for quarantine surveillance. FSM, Solomon Islands and Vanuatu are to follow by July, 1996).

4. User friendly database on fruit flies using information from 1 and 2 to assist in quarantine decision-making by exporting and importing countries. (SPC Plant Protection Service is to be custodian of the database. Countries are to have their own data and access through SPC to information on fruit flies throughout the region).

5. Government personnel and a private sector aware of, and trained in, fruit fly surveillance and assessment techniques, so that advice on fruit flies to Governments is of high quality and national staff are capable of undertaking consultancies on fruit flies on behalf of SPC.

Actual Outputs for Immediate Objective 1

The compilation of updated, valid information on fruit flies in the project countries is based on results of trapping and host survey activities. These activities will, in the long term, form the basis of the quarantine surveillance system that is essential if Pacific Island Nations are to negotiate quarantine requirements with importing countries.

1. **Trapping Activities**

During 1994, trapping activities in Cook Islands, Fiji, Tonga and Western Samoa continued. During 1990-1993, all flies collected in the traps were submitted to Brisbane for confirmation of identification under a sister project funded by the ACIAR. In 1994, the countries assumed the responsibility for identifications and entering seasonal abundance data into a computer database. This is seen as an important step in the sustainability of the project and demonstrates the enhanced technical capacity within project countries.

Also, trapping stations in Fiji and Western Samoa were rationalized and re-arranged so that the permanent trapping stations for quarantine surveillance are now located near the houses, villages or farms of Ministry staff so that the traps can be serviced cheaply and regularly.

No new species of fruit flies have been recorded in Cook Islands, Fiji, Tonga or Western Samoa during 1994. However, there is uncertainty with respect to one species in Tonga, ie *Bactrocera facialis*. Though this species occurs in large numbers on host plants on Vava'u, it is not as readily attracted to Cue-Lure in traps there as it is in Tongatapu. It is necessary to undertake further studies on this species,

possibly DNA studies in Queensland.

The populations of fruit flies in Western Samoa have recovered from drastically reduced numbers after Cyclone Val in December, 1991. Over 2,000 *B. kirki* can now be trapped per month per trap.

78 permanent trapping stations have been set up in Vanuatu using Extension and Quarantine staff based on Ambrym, Banks Islands, Efate, Epi, Espiritu Santo, Malakula, Paama, Pentecost, Shepherd Islands, Tanna and Torres Islands. The traps are serviced at least monthly. At least two new species have been recorded, making a total of 11 species of which 2-3 species are of economic importance. The major species are *Bactrocera trilineola* (recorded from 12 hosts already) and *B. umbrosa*, a major pest of breadfruit and jackfruit.

The trapping programme in Solomon Islands has been restricted to northern Guadalcanal and, very recently, on Russell Island, Florida Island, Savo Island and Malaita. Even so, 6 species new to science were recorded during the first 3 months of trapping. One of these species is morphologically similar to melon fly (*B. cucurbitae*) - so similar that it could easily be mistaken for melon fly by inexperienced fruit fly workers. Flies from a quarantine survey of Russell Island, just north of Guadalcanal, were identified positively as being melon fly, thus expanding the geographic distribution of this species in the Solomon Islands. This record was confirmed by rearing melon fly from samples of pawpaw and snake gourd collected on Russell Island. Melon fly has now been recorded from one trap on Malaita, expanding its distribution even further.

These initial results clearly indicate the complexity of the fruit fly fauna in Solomon Islands. At this stage, at least 31 species are known to occur. Once surveys in the Choiseul, Western, Isabel, Central, Makira and Malaita Provinces commence, this number will increase considerably, particularly in the Provinces closest to Papua New Guinea (PNG). PNG has enormous diversity of fruit fly species - probably more than 150 species, many of which are economically important to fruit and vegetable production. There is evidence that movement of fruit flies easterly through New Britain and Bougainville is taking place.

Trapping in FSM commenced on Pohnpei in December, 1994 and, as expected, only mango fruit fly (*B. frauenfeldi*) has been recorded. Plans are in place to set up quarantine surveillance in Kosrae in April, 1995 and progressively set up surveillance in Chuuk and Yap during the first half of 1995.

All fly specimens from Solomon Islands and Vanuatu have been submitted to Dr. Richard Drew, Queensland Department of Primary Industries (QDPI), Brisbane for identification. Dr. Drew is preparing named voucher specimens to be send back to each country so that national staff can commence to do their own fruit fly identifications. These data are being entered in the Pacific Fruit Fly Database in Brisbane.

2. Host Surveys

Regular surveys of commercial/edible and wild fruits and vegetables continued in Cook Islands, Fiji, Tonga and Western Samoa as part of the information gathering exercise and quarantine surveillance. Greater emphasis was placed on sampling of high risk fruits and vegetables to monitor for exotic fruit fly species than on broad surveys of all fruits. Nevertheless, in 1994-95, over 4,540 samples were collected in the 7 countries. This brings the total number of samples for 1990-1995 to over 18,084 and equates to about 7 tonnes of fruits and vegetables collected. Table 1 shows the number of samples collected in each country during 1994-1995 and the numbers of new host records.

In general, the number of new, economically important hosts being recorded is minimal. For example, in Tonga in 1994-95, 8 new host records were recorded - 2 for *B. xanthodes*, 5 for *B. facialis* and one for *B. distincta.* Of these, only 3 would be regarded as being of economic importance. On this basis, host surveys in Cook Islands, Fiji, Tonga and Western Samoa should focus on high risk fruits and vegetables that would be most likely infested by exotic fruit fly species. These crops include guava, banana, mango, *Syzygium* spp., *Terminalia catappa*, carambola, cumquat, orange, mandarin, pomelo, pawpaw, eggplant, chilli, capsicum and cucurbits.

The data in Table 1 show that Fiji and Tonga have refocussed the host surveys so that they perform a quarantine surveillance function, in conjunction with trapping. The recovery of fruit flies from 23.3% and 22.2% of samples collected in Fiji and Tonga, respectively, shows that more high risk fruits are being sampled now than previously. In contrast, in Solomon Islands, where sampling is done on a broad scale, 11.2% of samples collected yield fruit flies. In Fiji, in 1990-93, less than 10% of samples collected produced fruit flies.

Table 2 shows the number of plant species that are infested by each fruit fly species by country. It should be noted that data from Solomon Islands, Vanuatu and FSM is preliminary. Despite this, the endemic or adventive species are the most important economically, as indicated by the number of host records. For example, *B. trilineola* in Vanuatu has already been recorded from 18 hosts (11 commercial/edible + 7 wild). In Solomon Islands, *B. frauenfeldi* has been recorded from 12 hosts (9 commercial/edible + 3 wild). There is no doubt that the host ranges in these countries will be increased substantially.

Staff in Cook Islands, Fiji, Tonga and Western Samoa are entering host survey data into computers and this will complement the database currently housed with the ACIAR Project at the Queensland Department of Primary Industries (QDPI), Brisbane, Australia.

Host surveys commenced in Vanuatu in May, 1994, in Solomon Islands (Guadalcanal only) in July, 1994, and in FSM in December, 1994. Vanuatu staff have collected 1107 samples from Efate, Espiritu

Santo, Malakula, Malo, Paama, Vanualava, Motarlava and Torres Islands. *B. trilineola* is by far the most important species economically, being recorded from 11 commercial and 7 wild hosts.

876 samples of wild and commercial fruits have been collected in northern Guadalcanal, Solomon Islands. The major species recorded included *B. frauenfeldi*, *B. umbrosa* and *Dacus (Callantra) solomonensis*. Undoubtedly, both the range of species and hosts will increase as surveys in other Provinces get underway. Melon fly (*B. cucurbitae*) was recorded from a sample of pawpaw and snake gourd collected from Russell Island, north-west of Guadalcanal. As melon fly also occurs in Malaita, it is strongly recommended that cucurbits are regularly sampled in Guadalcanal as part of quarantine surveillance.

The losses attributable to fruit fly damage is much better understood now than previously. Table 3 gives an indication of the losses caused by fruit flies in several countries. This data has been collected over the duration of the project, particularly during protein bait spray testing during 1993 and 1994.

3. **Database**

The combined efforts of the RFFP and the ACIAR Project based in Brisbane, Australia, have generated an enormous amount of biological data on fruit flies in Cook Islands, Fiji, Tonga and Western Samoa. The data include species present in each country, their seasonal abundances, parasitoid fauna, levels of damage, and stages of maturity when fruits are susceptible to attack. This data has been stored in an Rbase programme at the QDPI laboratory at Indooroopilly, Brisbane, Australia. It was planned to hold a regional workshop in July, 1995 to train staff from these countries and SPC in the use of the database and to transfer the database to SPC and to the countries. This had to be postponed and will now be run during September-October, 1995 and it will now include participants from Solomon Islands, Vanuatu, FSM and maybe PNG.

As well as the transfer of the database to SPC and each country, a representative reference collection of fruit flies from the Pacific region and their parasitoids will be deposited in each country and with SPC.

Immediate Objective 2

To reduce the levels of damage to fresh fruits and fleshy vegetables caused by fruit flies during production.

Expected Outputs

1. Development and adoption of cheap, environmentally sound, effective strategies for fruit fly

control, based on protein bait sprays using yeast autolysate, either from local sources or from Australia.

2. Awareness by farmers of the benefits of good crop hygiene practices.

3. Government personnel and farmers trained in bait spray techniques.

Actual Outputs for Immediate Objective 2

The field control of fruit flies focusses on the use of protein bait sprays, together with sound crop hygiene and, in some crops such as pawpaws and bananas, harvesting at a stage of maturity that is not as susceptible as ripe fruits. This approach ensures that environmental contamination by pesticides is kept to a minimum and that beneficial insects (pollinators and biological control agents) suffer minimal deleterious effects. Basically, it is an integrated pest management approach.

1. **Field Testing of Protein Bait Sprays**

The work on the use of protein bait sprays has progressed considerably during 1994. The effort focussed on control of fruit flies in vegetables in Tonga, area control in Fiji, and the modification and testing of waste yeast from Tonga's Royal Brewery as a source of protein for bait sprays. Preliminary field tests using Mauri's Pinnacle Protein Insect Lure (MPPIL) have been done in Western Samoa and attempts to modify the waste yeast from the Vailima Brewery have been made, but were not successful. Observation trials using MPPIL have been done in FSM, Solomon Islands and Vanuatu.

In Tonga, extensive trials on controlling fruit flies in capsicums and three varieties of chillies with different levels of susceptibility to fruit fly attack, were conducted over an 18 month period. By applying about 10 litres of protein bait spray per hectare as a band to the foliage of capsicum plants in every third row, once a week from fruit set to harvest, it was possible to reduce levels of damage from 97-100% to less than 7%. The bait comprised 50ml of MPPIL plus 4ml of 50% emulsifiable concentrate malathion made up to 1 litre with water. This level of control now makes it feasible to produce capsicums for the local and export market in Tonga.

Field trials on chillies in Tonga showed that by applying protein bait spray as for capsicums, it was possible to reduce the level of damage from 97% to about 2% in the highly susceptible variety, 'Hot Beauty.' Interestingly, for 'Hot Beauty', there was evidence that there was a marked difference between the susceptibility of ripe chillies (ie. red) and mature green chillies to fruit fly attack. The 'Long Red' variety showed low susceptibility to fruit fly attack - not reaching above 12% in untreated plots. These results are important as the bait spray technique has become mandatory as part of interim measures developed by Tonga, Fiji and Cook Islands and New Zealand for the export of some commodities.

2. Area Control Using Bait Sprays

In Fiji, work on the use of the protein bait spray technique in a whole village situation, often referred to as area control, commenced. In this situation, there is often a wide range of fruits and vegetables, with different fruiting times, making fruit fly control difficult. The greatest difficulty is assessing the effectiveness of a treatment such as protein bait spraying because of the relatively small amount of fruit available for sampling over a long period, compared to that of a commercial orchard. In 1994, two areas were used, primarily to determine how an assessment of effectiveness could be done reliably. It seems that using guava and cumquat as indicator fruits, may work and this will be tested during 1995.

Sampling of cumquat over a period of 3 months showed some interesting results that support strongly the destruction of fallen fruits as a component of integrated pest control. The levels of damage to cumquat were higher for fruits sampled from the ground as opposed to ripe fruits harvested from the trees. This indicates, though further sampling needs to be done, that *B. passiflorae* infests cumquat on the ground as well as on the tree. Consequently, destruction of fallen fruit may reduce resident populations of fruit flies significantly.

3. Modifications of Brewery Waste Yeast

The establishment of a prototype plant at the Royal Brewery Co., Tonga, to modify waste yeast into a usable protein for bait spraying has been delayed. A building to house the plant was completed by the brewery in January, 1995. This delay has been because undertaking the research on methods of converting the waste yeast into protein has taken longer than expected. Initially, slow heating of waste yeast at 70^0C for long periods was considered the best method of autolysis. However, the resultant product proved to be much less attractive to fruit flies in the field than the existing Australian protein autolysate from Mauris, despite being attractive in laboratory tests.

The procedure being used now is to reduce the volume of the waste yeast by 50% by vigorous heating. Field tests being done by the QDPI in Brisbane show that this product is much more attractive to fruit flies than the earlier Tongan formulation. These results also changed the thinking on the type of equipment required in Tonga from using a spiral-flow heating process to using two vats heated by steam - one vat for vigorous heating and the second vat to which enzymes such as papain, could be added at a lower temperature to complete the autolysis process. The vat in which vigorous heating occurs has to have a specialised Teflon insert and stirrer that prevents sticking. The supply of the equipment by a company from Sydney has delayed this component of the project. It is expected that the first field tests on the modified waste yeast in Tonga will take place on capsicum in July-August, 1995. In the meantime, where protein bait sprays are required, MPPIL from Australia is being used.

4. **Training on Bait Spray Technology**

To ensure that farmers are aware of the value of the protein bait spray technology and the need to maintain sound crop sanitation, field days and workshops have been conducted in Fiji (July, 1994 in Sigatoka Valley), Tonga (February, 1994 at Vaini Research Station), and Western Samoa (November, 1994 at Nu'u Research Station). 34 farmers, exporters and Government personnel attended in Fiji; 50-60 in Tonga and 25 in Western Samoa. Also, the UNV in Vanuatu has conducted initial training of Government personnel from Efate, Espiritu Santo, Malakula, Torres and Banks Islands and Tanna. A seminar covering bait spraying was given by the CTA while in Solomon Islands (March, 1995) and FSM (March, 1995).

Immediate Objective 3

To strengthen the capacity of quarantine services and the private sector to overcome quarantine restrictions on the export of fresh fruits and fleshy vegetables imposed by importing countries.

Expected Outputs

1. Advice on formulating quarantine protocols and procedures for host susceptibility testing, disinfestation treatments, quality assurance schemes and contingency plans for eradication of exotic species of fruit flies.

2. Development and adoption of new post-harvest disinfestation treatments as alternatives to fumigation with ethylene dibromide appropriate to the project countries and acceptable to importing countries.

3. Increased confidence of country personnel in generating and collating data on post-harvest disinfestation treatments in order to negotiate quarantine agreements for export produce with importing countries.

Actual Outputs for Objective 3

Project work on developing alternative quarantine treatments can be broken into the maintenance of laboratory colonies of fruit flies and associated biological studies, host status testing, post-harvest quarantine treatment development, and negotiations on quarantine protocols and access to overseas markets.

1. Laboratory Colonies and Associated Biological Studies

The following laboratory colonies of fruit flies were maintained or established regionally during 1994 and early 1995 :

.	Cook Islands	*B.melanotus, B. xanthodes*
.	Fiji	*B. passiflorae, B. xanthodes, B. distincta*
.	FSM	*B. frauenfeldi*
.	Tonga	*B. facialis, B. xanthodes, B. kirki, B. distincta*
.	Western Samoa	*B. kirki, B. xanthodes, B. samoae, B.* near *xanthodes, B. distincta*
.	Vanuatu	*B. trilineola, B. quadrisetosa, B. umbrosa, B.* near *xanthodes, B. minuta*
.	Solomon Islands	*B. frauenfeldi, D. solomonensis, B. umbrosa.* (The latter two died out, but are being restored).

Life history and rate of development studies have been completed for *B. facialis, B. kirki, B. melanotus, B. passiflorae, B. samoae, B. trilineola*, and *B. xanthodes*. Scientific papers on these topics are being prepared.

Artificial diets have been developed for most species. Pawpaw/Torula Yeast/Nipagin M or Sugarcane Bagasse/Pawpaw/Torula Yeast/Nipagin M form the basis for larval diets for most species. Exceptions are *B. umbrosa*, which requires a diet based on breadfruit or jackfruit, and *D. solomonensis*, that will require a diet based on cucurbits (squash or pumpkin)/Torula yeast/Nipagin M. Tests have been done in Tonga on coconut husk as a replacement for sugarcane bagasse.

Difficulties in rearing *B. kirki* in Tonga persisted through 1994 for no easily discernible reason. For this reason, all life history and heat tolerance studies related to *B. kirki*, have been transferred to Western Samoa.

2. Host Status Testing

During 1994, a major effort has been made to undertake or complete both laboratory cage tests (LCT) and field cage tests (FCT) on a range of fruits and vegetables that may have export potential and are of low risk to fruit fly attack at a particular stage of maturity. If particular fruits or vegetables are not hosts to fruit flies using one or both of these tests, they may be exported to New Zealand without post-harvest treatment. Host Status Tests (both LCT and FCT) were conducted in Fiji, Tonga, Western Samoa, Cook Islands and Vanuatu. The results of tests done in 1994 and 1995 are listed in Table 4.

The test results have to be submitted to New Zealand Ministry of Agriculture and Fisheries (Regulatory

Authority) for technical assessment and scrutiny before the Project can report that a particular commodity is categorised as a non-host for the purpose of export to New Zealand. Reports on the test results of 3 varieties of pineapples at colour break and ripe, squash in Fiji and cucumber are in preparation for submission by the Fiji Ministry of Agriculture, Fisheries and Forests to New Zealand.

Other commodities that look promising are bitter gourd, spongy gourd, bottle gourd and limes in Fiji and two varieties of watermelons from Tonga. The watermelon varieties need to be tested using *B. kirki* to complete the data set.

3. Post-Harvest Quarantine Treatment Development

The generation of data on the heat tolerances of early and late eggs, first instar larvae, and feeding and non-feeding third instar larvae in Tonga and Fiji is behind schedule. Fiji has now completed the data for early and late eggs for *B. passiflorae* and *B. xanthodes*, and for first and third instar larvae of *B. xanthodes*. Tonga has completed data on early and late eggs for *B. facialis* and *B. xanthodes*. There is a total of 15 weeks of work to complete the research on the 3 larval stages, so this phase of the research should be completed by June, 1995, about 3 months later than expected.

Because of problems of laboratory rearing of *B. kirki* in Tonga, this work has been transferred to Western Samoa. Equipment for static hot water bath studies has been ordered. This decision has the benefit of ensuring that Western Samoa will have the technical capacity to undertake further work on using heat as a quarantine treatment. It will be necessary to seek funding for an experimental hot forced air unit and, if necessary, a commercial unit at a later stage.

Through linkages with the USAID Commercial Agricultural Development (CAD) Project, experimental hot forced air units were provided to Tonga and Fiji in August, 1994. This has allowed national staff to become familiar with the operation of the units and to run preliminary tests on mangoes, tomatoes, eggplant and 'Sunrise' pawpaw through the units. Testing of artificially infested fruit will commence in June-July, 1995, after the heat tolerance studies on immature stages are completed.

Under the CAD Project, commercial hot forced air units will be provided to Fiji and Tonga on the basis that they are 'owned' and operated by the private sector, with Government providing the auditing role. These units are due to be installed in July and certified by the end of September, 1995.
Static hot water baths are being purchased for Vanuatu, Solomon Islands and FSM so that, once laboratory colonies are established and stable, and life history studies are done, research into the heat tolerances of eggs and larvae of species in each country can be done. The aim is to build up information on the heat tolerances of species on a regional basis in the hope that one treatment temperature and exposure time (ie. a generic treatment) will be suitable for all commodities (or most) within the South Pacific.

4. Negotiations on Quarantine Protocols

The RFFP has been instrumental in both providing data on fruit flies to potential importing countries, particularly New Zealand and the USA, and assisting, as a technical adviser, in negotiations on quarantine protocols for the export of fresh fruits and vegetables.

The major achievements for 1994 and 1995 include the following :

. The proven effectiveness of the protein bait spray technology as a field control method for fruit flies has resulted in this technique being included in interim measures that will allow Pacific Island Nations to export low risk commodities to New Zealand. These measures are designed to overcome the loss in markets brought about by the virtual loss of ethylene dibromide (EDB) fumigation.

. Data from host surveys and host status testing proved valuable in negotiating the trans-shipment of low risk commodities (eg. cucurbits, eggplant, chilli, okra, squash) from Fiji through Honolulu to markets in Canada.

. Re-opening of the eggplant market in New Zealand when it was found that the maximum residue level for EDB was not exceeded in eggplant fumigated with EDB and then exported.

. Re-opening of the market for 'Hot Rod' and 'Red Fire' chillies in New Zealand as a result of research into the susceptibility of these varieties to fruit flies in Fiji using Host Status Tests. These varieties proved to be non-hosts for the fruit fly species in Fiji.

. Opening of negotiations with the Australian Quarantine and Inspection Service on the acceptability by Australia of Host Status Testing done for New Zealand and the transferability of quarantine heat treatments developed for pawpaws and mangoes using New Zealand standards.

One of the most significant aspects of these negotiations with overseas quarantine authorities is the acceptance by importing countries, such as New Zealand and USA, of the data on fruit flies, that are being generated by the project countries. Together with enhanced technical capacity of staff and increased knowledge on fruit flies and their management is a marked improvement in the confidence of national scientists and technicians to discuss the fruit fly and associated quarantine problems. This confidence will grow further in the next two years.

Training

Improving skills of national and regional staff is an integral part of ensuring sustainability of project activities. The training provided during 1994 and early 1995 cuts across the three Immediate Objectives and is consistent with the whole-system approach taken by the RFFP to remove constraints to trade brought about by the presence of fruit flies. Below is a summary of the training provided during this period :

. two-day Workshop on Fruit Flies and their Control for 50-60 participants from Government and the private sector in Tonga in February, 1994;

. support for one quarantine officer from each of Western Samoa, Tonga, Fiji, Vanuatu and Solomon Islands to attend the Workshop on Certification of Commercial Hot Forced Air Units held in Rarotonga in July;

. training for UNV and National Counterpart from Solomon Islands in Fiji for 2 weeks in May;

. field day and demonstration of protein bait spray technology to 34 farmers and Government personnel at Anil Kissun's farm in the Sigatoka Valley in July;

. three-day Workshop on Fruit Flies and their Control for about 25 participants at Nu'u Crop Development Research Station, Western Samoa in November;

. placement training for 2 weeks for National Counterpart from Vanuatu in November and Laboratory Assistant from Tonga in December;

. project briefing and familiarisation for UNV from FSM for 2 weeks in November;

. practical training on trapping and bait-spraying for Plant Protection staff in Solomon Islands in March, 1995;

. attachment training for one quarantine officer from each of Tonga, Fiji and Western Samoa in New Zealand for 2 weeks in March, 1995.

HUMAN RESOURCE INPUTS

Table 5 summarises the human resource inputs to the RFFP, provided by the project and by the Governments.

In addition to these human resources, SPC through the Acting Manager Agriculture Programme (Dr.

Malcolm Hazelman), the Plant Protection Adviser (Mr. Semisi Pone), the Administration cell in Suva and Management in Nouméa provide valuable inputs into the execution of the project.

Technical backstopping implementation support is provided through FAO in both Apia and Rome.

One of the greatest concerns facing the project is the continued commitment of Governments to maintain staffing levels for fruit fly related work. Continued commitment will build on the advances already made and will encourage an appropriate technical and production environment for increasing the availability of fresh fruits and vegetables for local consumption and export. Private enterprise development will, in itself, encourage the sustainability of research into fruit flies with an identified need for more efficient field control methods and a greater range of quarantine treatments being available for export commodities.

Women play an important role in the RFFP. Of the 34 personnel currently involved in the project, 9 are women.

BENEFITS AND TARGET BENEFICIARIES

Social

Providing the protein bait spray technology is widely adopted, production of fresh fruits and vegetables by the commercial sector and small scale producers will be substantially increased. The commodities produced will have less pesticide residues. This will be a healthier product for consumers. Increased production may foster greater use of fresh commodities to improve the diets of people. This approach fits in with the UNICEF/UNDP Family Food Security Project plan of arousing domestic demand for high quality, nutritional commodities.

Gender

Women play an essential role in agriculture, particularly at the subsistence level. They are aware of the losses caused by fruit flies and the remedial action to reduce losses. For this reason, women farmers and extension officers are strongly encouraged to participate in training. For example, in Vanuatu, during World Food Day, a series of lectures and displays was mounted in the new Port Vila market, mainly to focus on women farmers. Training on fruit fly control was provided to 25 women from 14 countries at the SPC Community Education Training Center in Suva. The numbers of women attending training workshops in Tonga, Cook Islands and Fiji have increased, due to proactive encouragement of women by project staff.

Women in professional and technical positions in the RFFP make up 26% (11 out of 42 staff) of staff working on fruit flies in the 7 project countries.

Economic

The technologies developed by the project will increase production of fresh fruits and vegetables or, in some cases such as capsicum and chilli in Tonga, will make production feasible. Together with increased production comes incentives for the private sector to expand into greater production, marketing or exporting, and possibly processing. Greater technical knowledge and management of the fruit fly problem will increase the confidence of local exporters, the market overseas, and quarantine authorities, in the quality of commodities produced in the South Pacific. Removal of constraints on export by developing quarantine treatments will also increase the confidence of farmers and exporters.

At the farm and village level, simple procedures such as bagging of fruit and using protein bait sprays on a whole village basis may increase fresh food availability for local consumption and local sales.

Environment

New technologies developed by the project are environmentally friendly. The use of protein bait sprays to replace broad spectrum insecticides that are absorbed into the fruit to kill eggs and larvae, reduce the insecticide residue levels in fruit. The bait spray technique conserves beneficial insects such as pollinators and biological control agents, thus increasing fruit set and ultimately production.

The modification of waste yeast from local breweries will provide a cheap source of protein for the bait. As well, the waste yeast will not be disposed of into storm water drains and ultimately into the sensitive marine environment. Excess modified waste yeast may be used as a high protein source as an additive to stock feed.

The use of heat as a quarantine treatment will remove the EDB residue problem from fruits and vegetables and the quality of treated fruits and vegetables will be noticeably improved. Shelf-life will be increased so the consumer will buy a better quality product.

Institution Building and Sustainability

As mentioned earlier in the report, a high priority has been placed on training of national staff, farmers and exporters. Regionally, in 1994-1995, over 100 Government personnel (Plant Protection, Quarantine, Extension), farmers and exporters received training at workshops and seminars. A programme of progressively providing attachment training for national quarantine staff in New Zealand commenced in early 1995, by sending one Quarantine Officer from each of Tonga, Fiji and Western Samoa for 2 weeks to Auckland. This will continue for 1995 and 1996, with an aim of training at least another 6 staff. Funds for this training have been provided by the New Zealand Government.

The focus of the project in institutional building and sustainability is to ensure at least 1 or 2 professional staff are adequately trained in fruit flies in each country so that collectively the region understands fruit flies and has the capacity to manage them.

The prospects of sustainability of project activities are high because the private sector will apply pressure to Governments to provide appropriate services. Of course, sustainability will only occur if Governments are committed to providing funding support for staff at appropriate professional and technical levels and for continued operations of quarantine surveillance and quarantine treatment research.

One aspect of the project activities is certain. If the confidence in quarantine surveillance and quarantine treatment research and operations shown by importing countries, is reduced in any way, export markets will no longer be accessible. This will result in loss of confidence of local exporters and farmers and a return to the pre-1990 era.

EQUIPMENT AND SUPPLIES PROVIDED

Facilities

Cook Islands, Fiji, Tonga and Western Samoa were supplied with adequate laboratory facilities during Phase 1 of the RFFP or through assistance from the New Zealand Government in the case of the culture laboratory in Cook Islands. In all cases, one laboratory is used for holding fruit samples and one for holding laboratory colonies of fruit flies. The latter has been air conditioned. In general, the Governments provided the laboratory and the RFFP modified the buildings and added air conditioning, where necessary.

Existing buildings in Solomon Islands, Vanuatu and FSM have been modified for the purposes of fruit holding and rearing fruit flies. Because melon fly does not occur in Guadalcanal, it is not possible to set up a laboratory colony of this species there. Another location may be required (eg. Noro). A new laboratory is to be built in Pohnpei near the Land Grant Programme laboratory. In the meantime, temporary facilities at Kolonia are being used.

Equipment

Major purchases made during 1994/95 included the following :

Solomon Islands (US$22,393.00)

Suzuki 4x4 Wagon
Computer and Printer
Refrigerator/Freezer
Fibre-Glass canoe
30hp Outboard Motor
Laboratory benching/shelving
Whiteboard
Water Tank
Insect Cages
Collecting poles and cutting head
Water containers
pH Meter
Blender
Vanuatu (US$22,073.00)

Suzuki 4x4 Wagon
Refrigerator/Freezer
Computer and Printer
Laboratory modifications
Blender
Pressure Cooker
Collecting poles and cutting head
Insect cages - internal and external

FSM (US$3,347.00)

Laboratory shelving and benches
Insect Cages
Collecting poles and cutting heat
Blender
Heater for sterilising sawdust

Western Samoa (US$7,857.00)

Second-hand 4x4 vehicle
Computer (to be transferred from Vanuatu)

Tonga, Fiji and Cook Islands

No major equipment items were purchased, except for modifications for housing the experimental hot forced air units and generators in Fiji and Tonga.

Supplies

Regular supplies of traps, lures, plastic containers, artificial diet components, paper and plastic bags, specimen boxes, masking tape, marking pens, etc were provided to each country. These items are mostly purchased in bulk through Fiji and trans-shipped to project countries.

RECOMMENDATIONS

Immediate Objective 1

Recognising that quarantine surveillance to identify incursions of exotic fruit flies and to monitor existing species is essential and a prerequisite for negotiations on export of fresh fruits and vegetables, it is recommended that :

1. The Governments of Tonga, Fiji, Cook Islands and Western Samoa take over the financial and operational responsibility for quarantine surveillance (trapping and targeted host surveys) from 1 January, 1996.

2. The RFFP and national staff in Solomon Islands, Vanuatu and FSM continue to carry out extensive trapping and host surveys throughout each country, utilising Quarantine, Extension and Research staff, until at least 1 July, 1996, when a reasonable understanding of the species of fruit flies and their host ranges will be available.

3. The Governments of FSM, Vanuatu and Solomon Islands take over the financial and operational responsibility for quarantine surveillance by 1 July, 1996.

4. The RFFP, in conjunction with ACIAR and SPC Plant Protection Service, conduct a two week workshop in September - October, 1995 to train national staff on the use of the Pacific Fruit Fly Database and other fruit fly activities.

5. The RFFP arrange the transfer of the Pacific Fruit Fly Database to SPC, as the custodian of the complete database and the transfer of data on fruit flies specific to each country to each country as a read only database by 31 October, 1995.

6. The RFFP arrange with ACIAR to supply each country and SPC with a reference collection of pinned fruit fly specimens from the South Pacific, including representative specimens of exotic species of major quarantine importance.

7. The RFFP, in conjunction with ACIAR and national staff, publish scientifically and as advisory leaflets, data on fruit fly fauna and their biology and ecology. Drafts should be completed by June, 1996.

8. The RFFP, in conjunction with SPC Plant Protection Service and national Quarantine, Extension and Research staff, develop contingency plans to cope with outbreaks of exotic species of fruit flies. This exercise be initiated during Workshops in September - October,

1995.

Immediate Objective 2

It is recommended that :

1. The protein bait spray technology developed in Fiji, Tonga and Cook Islands be transferred to FSM, Solomon Islands and Vanuatu through seminars and training of national staff and farmer groups. This commenced in February, 1995.

2. Where necessary, field trials to test the effectiveness of protein bait spray be conducted in FSM, Solomon Islands, Vanuatu and Western Samoa, commencing during the second quarter of 1995.

3. Specific field trials on area control and use of border application of protein bait sprays to trap crops to control melon fly in Solomon Islands, are to be conducted during the second half of 1995.

4. The RFFP speed up the development of protein bait from waste yeast from the Royal Beer Co., Tonga so that the first field tests on capsicums using the modified waste yeast can be done in July-August, 1995.

5. Countries other than Tonga commence, by June, 1995, experiments on modifications of waste yeast from local breweries as a protein source for bait sprays.

6. The RFFP investigate ways of commercialising the production and sale of protein bait sprays made from brewery waste yeast.

7. The RFFP, in close cooperation with Extension groups, actively encourage the adoption of the protein bait spray technology as part of a quality assurance system by December, 1995.

Immediate Objective 3

It is recommended that :

1. All project countries maintain laboratory colonies of the respective economically important species as an on-going activity and for use for quarantine treatment development research.

2. National staff in Tonga and Fiji complete the heat tolerance research on eggs and larvae of fruit flies by July, 1995; Western Samoa to complete research by December, 1995.

3. Quarantine treatments using hot forced air for pawpaw and mangoes be available in Fiji and Tonga by December, 1995 and 1996, respectively.

4. Quarantine treatment using hot forced air or hot water immersion be available for eggplant by December, 1996.

5. The RFFP and national staff in Vanuatu, Solomon Islands and FSM commence heat tolerance research on their species by August, 1995.

6. The RFFP, in collaboration with SPC and the countries, investigate funding sources for experimental and commercial hot forced air units for disinfesting fruits and vegetables by September, 1995.

7. All project countries conduct host status testing of fruits and vegetables that are low risk for fruit flies as a prelude to developing quarantine treatments based on heat.

8. The RFFP continue to consult with Australian and New Zealand quarantine authorities on prospects of using the principle of equivalence for acceptance of quarantine treatments and other quarantine protocols.

9. The RFFP provide support for visits by Quarantine staff to Fiji to become familiar with certification process for commercial hot forced air units during August-September, 1995.

10. The RFFP, with financial assistance from the New Zealand Government, continue to organise training for quarantine officers from Cook Islands, FSM, Vanuatu and Solomon Islands during 1995.

Publication and Reporting

It is recommended that :

1. Collectively, the RFFP and countries compile a Procedures, Manual for Fruit Flies in the South Pacific.

2. The RFFP and national staff publish scientifically results of protein bait spray testing, host status testing, laboratory culturing and associated biological studies, and quarantine treatments. Drafts to be completed by June, 1996.

Table 1 : Numbers of fruit and vegetable samples collected under the Regional Fruit Fly Project as of April, 1995

Country	No. Samples in 1994-95	No. Samples in 1990-95	No. of New Host Records	% Recovery in 1994-95
Cook Islands	52	2649	0	N/A
Fiji	596	4845	1	23.3
Tonga	790	3599	8	22.2
W. Samoa	1171	5008	9	7.5
FSM	238	238	13	33.0
Solomon Is.	876	876	17	11.2
Vanuatu	1107	1107	23	8.4

Table 2 : Numbers of species of commercial/edible and wild hosts for fruit flies in 7 Pacific Island Nations

Country/Fruit Fly Species	Number of Host Plant Species		
	Commercial	Wild	Total
Cook Islands			
B. melanotus	14	8	22
B. xanthodes	4	3	7
Fiji			
B. distincta	1	0	1
B. gnetum	0	1	1
B. passiflorae	24	25	49
B. xanthodes	4	2	6
Tonga			
B. facialis	27	37	64
B. distincta	2	5	7
B. kirki	13	7	20
B. obscura	0	0	0
B. passiflorae (Niua's only)	5	7	12
B. xanthodes	12	5	17
Western Samoa			
B. aenigmatica	0	1	1
B. distincta	2	0	2
B. kirki	7	12	19
B. obscura	0	1	1
B. paraxanthodes	0	3	3
B. samoae	1	11	12
B. xanthodes	5	0	5
FSM *			
B. frauenfeldi	12	1	13
Solomon Islands *			
B. cucurbitae	3	0	3
B. frauenfeldi	9	3	12
B. umbrosa	1	0	1
D. solomonensis	2	0	2
Vanuatu *			
B. minuta	0	1	1
B. paraxanthodes	0	1	1
B. quadrisetosa	0	1	1
B. trilineola	11	7	18
B. umbrosa	1	0	1

* denotes that these results are preliminary and the numbers of hosts will increase substantially. Also, in the case of Solomon Islands there are other fruit fly species reared from fruits and vegetables that are being identified by Dr. Drew in QDPI, Brisbane.

Table 3 : Losses attributable to damage by fruit flies (family Tephritidae) in some Pacific Island Nations.

Country	Crop	Percentge of Fruit Infested	Comments/Species Involved
Fiji	Guava	40-50	*B. passiflorae*
	Mango	20-25	Mainly improved varieties, such as Kensington. *B. passiflorae*
	Cumquat	60	*B. passiflorae*
	Kavika (*Syzygium malaccense*)	60	*B. passiflorae*
Tonga	Guava	90	*B. kirki/B. facialis*
	Capsicum	97-100	*B. facialis*
	Chilli	87-97	Some varieties are not infested. *B. facialis*
Cook Islands	Pawpaw	12	If allowed to ripen on tree during summer months. *B. melanotus/ B. xanthodes*
	Pawpaw	1	If allowed to ripen on tree during cooler months. *B. melanotus/ B. xanthodes*
	Mango	<2	*B. melanotus*
	Avocado	<2	*B. melanotus*
W. Samoa	Pawpaw - local	40	At ripe and half ripe stages. *B. xanthodes*
Vanuatu	Guava	95	*B. trilineola*
FSM	Guava	up to 100	*B. frauenfeldi*
Solomon Is.	Snake gourd	90	*B. cucurbitae/D. solomonensis*
	Squash/Pumpkin	60-90	*B. cucurbitae*

Table 4 : Host Status Tests performed on fruits and vegetable in Fiji, Tonga, Western Samoa and Vanuatu during 1994.

Country	Commodity/Stage of Maturity	Type of Test (1)	Fruit Fly Species (2)	Result (3)
Fiji	'Small White' chilli	LCT	Bx	-
			Bp	+
	'Small White' chilli	FCT	Bx	-
			Bp	+
	'Long Cayenne' chilli	LCT	Bx	+
			Bp	+
	Bottle Gourd (lauki)	LCT	Bx	-
			Bp	-
	Bitter Gourd	LCT	Bx	+
			Bp	-
		FCT	Bx	-
			Bp	-
	Spongy Gourd	LCT	Bx	+
			Bp	-
		FCT	Bx	-
			Bp	-
	'Waimanalo' pawpaw at quarter ripe, colour break, mature green	FCT	Bx } Bp }	Inconclusive. To be repeated as control fruit did not produce adult flies.
	'Sunrise' pawpaw at quarter ripe, colour break, mature green.	FCT	Bx } Bp }	As for 'Waimanalo' pawpaw
Tonga	Horned melon	LCT	Bf	+
	Tomato - green	LCT	Bf	+
			Bx	+
		FCT	Bf	+
			Bx	+
	Zucchini	LCT	Bf	+
			Bx	+
		FCT	Bf	-

	Watermelon 'Sugar Baby'	FCT	Bf		-
			Bx		-
	Watermelon 'Candy Red'	FCT	Bf		-
			Bx		-
	'Bird Eye Inferno' chilli	LCT	Bf	+	
			Bx		+
	Cucumber	LCT	Bf		-
W. Samoa	'Sunset' pawpaw (3 ripe)	LCT	Bx		+
	'Waimanalo' pawpaw (quarter ripe).	LCT	Bx		+
	Local pawpaw (quarter ripe).	LCT	Bx		+
	Carambola	LCT	Bx		+
			Bk		+
	Avocado	Natural	Bx	+	
			Bk		+
	'Lady Finger' Banana (Ripe)	LCT	Bx		+
			Bk		+
	Samoan Banana (Mature Green)	LCT	Bx		-
			Bk		+
	Abiu	LCT	Bx		+
			Bk		-
	Strawberries	LCT	Bx		-
			Bk		+
	Tomato (Ripe)	LCT	Bx		+
			Bk		+
	Zucchini	LCT	Bx		+
			Bk		+
	Cucumber	LCT	Bx		-
			Bk		+
	Chillies	LCT	Bx	}	To be repeated
			Bk	}	
Vanuatu	Capsicum	LCT	Bt		+
	Squash	LCT	Bt		-

Notes :

(1) 'LCT' = Laboratory Cage Test
'FCT' = Field Cage Test

Both tests used the "NASS Standard 155.02.01.08 Specifications for Determination of Fruit Fly Host Status as a Treatment" (New Zealand).

(2) 'Bx' = *Bactrocera xanthodes*
'Bp' = *B. passiflorae*
'Bf' = *B. facialis*
'Bk' = *B. kirki*
'Bt' = *B. trilineola*
'Bm' = *B. melanotus*

(3) '+' means that adult fruit flies were reared from the test fruit after exposure under LCT and/or FCT.
'-' means that adult flies were not reared from the test fruit after exposure under LCT and/or FCT, but adult fruit flies emerged from the control fruit.

Table 5 : Summary of Human Resource Inputs provided by the RFFP and Governments as of April, 1995

Country	Personnel	Position/Status	Funding Source
Regional Mgt	Mr. Allan Allwood	CTA	RFFP
	Ms. Shirley Antrea	Project Asst.	RFFP
	Dr. Malcolm Hazelman	Agric. Progrm (P/T)	SPC
	Mr. Semisi Pone	Plant Protection (P/T)	SPC
FSM	Mr. Luc Leblanc	UNV	RFFP
	Mr. Sailas Henry	Project Co-ordinator (P/T)	Govt
	Dr. Nelson Esguerra	Prin Investigator (P/T)	Land Grant
	Mr. Kim Alex	Technician (T)	Pohnpei State
	To be nominated	Counterparts in Kosrae, Yap and Chuuk	State Govts
Fiji	Mr. F. Vilisoni	Project Co-ordinator (P/T)	Govt
	Ms. Ema Tora	Graduate Trainee	Govt
	Ms. Laisa Ralulu	Agric. Assistant	Govt
	Ms. Losalini Leweniqila	Graduate Trainee (T)	NZ Govt
	Mr. Apenisa Balawakula	Agric. Assistant (T)	NZ Govt
Tonga	Mr. Pontiano Nemeye	UNV	RFFP
	Mr. Ofa Fakalata	Project Co-ordinator (P/T)	Govt
	Mr. Sione Foliaki	Entomologist	Govt
	Mr. Tupulotu Langi	Technical Officer	Govt
	Ms. Siutoni Tupou	Laboratory Assistant	Govt
	Ms. Emelini Mafi	Quarantine Assistant	Govt
	Mr. Una Katoa	Assistant (T)	RFFP/ACIAR /Govt.
Western Samoa	Ms Carol Quashie-Williams	UNV	RFFP
	Dr. Semisi T. Semisi	Project Co-ordinator (P/T)	Govt
	Mr. Osasa Aukuso	Senior Crops Officer (P/T)	Govt
	Mr. Billy Enosa	Crop Protection Officer	Govt
	Ms. Fa'alelei Tunupopo	Laboratory Assistant	Govt
	Mr. Paulo Malae	Field Assistant	Govt

Vanuatu	Mr. Abdul Kassim	UNV	RFFP
	Mr. Stephen Kalsakau	Project Co-ordinator (P/T)	Govt
	Mr. David Tau	Quarantine Officer	Govt
	Ms. Linette Berukukele	Laboratory Technician	Govt
Solomon Islands	Vacant	UNV	RFFP
	Ms. Ruth Liloqula	Project Co-ordinator (P/T)	Govt
	Mr. Maclean Vagalo	Entomologist (P/T)	Govt
	Mr. Francis Tsatsea	Technician	Govt
Cook Islands	Dr. Mat Purea	Proj. Co-ordinator	Govt
	Mr. Parei Joseph	Proj. Off. (Heat Tmt)	Govt
	Mr. William Wigmore	Senior R.O.	Govt
	Mr. Pavai Taramai	Research Asst	Govt
	Mr. Wilson Purakau	Lab Technician	Govt
	Ms. Elizabeth Munro	Research Asst	Govt
	Mr. James McKillop	Field Technician	Govt
	Ms. Tuaine Turna	Training (Alafua)	Govt.

Notes

1. "Status" in Column 3 refers to whether personnel are Part-time (P/T), Temporary (T) or full time (no designation).

2. The UNV in Solomon Islands has been terminated and will be replaced if the new framework for project implementation is put in place.

3. Staff inputs from Solomon Islands are not finalised as yet, but will be once Quarantine and Extension Divisions become more involved in the activities. Similarly, inputs from FSM are likely to increase as quarantine surveillance in Kosrae, Yap and Chuuk comes on line.

APPENDIX 1 FINANCIAL STATEMENT FOR TRIPARTITE REVIEW OF RAS/93/300 - REGIONAL FRUIT FLY PROJECT (PHASE II)

BACKGROUND

The Project, Enhancement of Production and Export of Fresh Fruits by Controlling Fruit Flies in the South Pacific, commonly referred to as the Regional Fruit Fly Project (RFFP), is funded under a cost-sharing agreement between UNDP and the Australian Government, through AUSAID. UNDP provides one-third of the funds (US$336,700) and the Australian Government provides two-thirds (US$680,000) for a period of 3 years (1994-1996). The total combined annual funding is US$421,920 in 1994, US$334,120 in 1995, and US$260,660 in 1996.

To assist the project in overcoming the loss in markets in fresh commodities, the New Zealand Government committed approximately US$125,000 over the 3 year period, through the South Pacific Commission. Funds are designed to employ a graduate trainee and technician in Fiji, purchase equipment to do heat tolerance testing in four countries, and to provide additional attachment training of quarantine officers.

To assist the sustainability of the fruit fly activities in the Federated States of Micronesia (FSM), a Memorandum of Understanding (MOU) was signed by the South Pacific Commission (SPC), the Agricultural Experiment Station/College of Micronesia (AES/COM) and the FSM Government. The MOU commits matching funds from USDA through AES/COM (US$101,400) and from the FSM Government (US$30,300) for 1995-96 to project activities.

This statement covers expenditure against various Budget Lines for 1994 and up to April for 1995.

EXPENDITURE FOR 1994 AND 1994

Attached are Tables 6 and 7. Table 6 is the draft Combined Delivery Report (CDR) for the RFFP for the period 1 January to December, 1994, produced by UNDP. Table 7 attempts to summarise expenditure during 1994 and the first quarter of 1995 to demonstrate the levels of expenditure and help answer why expenditure was below that expected in 1994.

Project Personnel (Excluding Official Travel)

Overall, this component is underspent, but some Budget Lines are overspent, eg. CTA and UNV Entomologist (Tonga). These Budget Lines need to be re-assessed in line with the mandatory budget revision due in May or June, 1995. Note should be taken that the realistic figure for the UNV (Western

Samoa) should be US$9178.48. This will change the percentage funds expended.

Official Travel

Expenditure on travel within countries has been below the level expected, primarily, because Vanuatu, Solomon Islands and FSM were in a project establishment phase. It is expected that travel, particularly in these three countries will increase during 1995.

The high level of expenditure attributable to travel by the CTA results from an unplanned trip to PNG for the Mid-Term Review of the UNDP's Regional Programme and the necessity to travel from Port Moresby to Apia for a planned Workshop, instead of from Nadi to Apia. The relatively high level of expenditure for 1995 (44.7%) resulted from the CTA's having to make an unscheduled visit to Solomon Islands to resolve problems there, in March, 1995.

Quarantine Treatment Development

The purchase of equipment to undertake heat tolerance testing of the eggs and larvae was expected to occur in late 1994. None of the new countries were advanced enough in laboratory culturing of flies or life history studies to warrant the purchase in 1994. These items will be purchased by July 1995, so rephasing of funds is required.

Training

Fruit Fly Workshop

A Training Workshop on the Pacific Fruit Fly Database and a refresher course on trapping, host surveying techniques, and protein bait sprays was planned for June, 1995. This has been postponed until the 25 September to 6 October. The scope has been expanded to include some elements of contingency planning to cope with outbreaks of exotic species.

Work Plan Review

The TPR will utilise all of the funds identified against this Budget Line.

Attachment Training

Only 53.5% of funds were expended during 1994. This is not uncommon in the first year. Until national staff are permanently appointed and settle in to the project activities in-country, placement training in the laboratory in Fiji is not normally provided. Extra training for national staff from Vanuatu, Solomon Islands and FSM is planned for mid-1995. A problem that arises in the provision of training is

that some national staff at the technical level are not permanent, but casual. The RFFP is reluctant to provide training other than in-country, on-the-job training to these staff, until the Governments give an undertaking that these staff will become permanent. Hence, there may be delays in training staff from some countries.

Equipment

Expendable Equipment

54.0% of funds were expended. This is mainly due to the late start of Solomon Islands (May, 1994) and FSM (December, 1994). The CDR shows that very small levels of funding were provided to the three new countries. This is not a true picture. The US$7,125.00 showed against Expendable Equipment denotes bulk purchases of traps, lures, plastic containers, plastic and paper bags, protein lure and diet components and supplies. These supplies come to Fiji and are then redirected to each country, as required. This ensures that the RFFP gets good prices and standard lines.

The expenditure against this item will increase, especially when expansion of activities into new areas of Solomon Islands and FSM occurs.

Non-Expendable Equipment

As expected, 82.8% of 1994 funds and 86.9% of 1995 funds have been expended. Most of the major equipment has been purchased (see pages 17-18 of the TPR Report), with the exception of materials for laboratory modifications in a centre in the Western Province of Solomon Islands, incubators for Solomon Islands, Vanuatu and FSM, and some essential laboratory equipment for FSM.

It should be noted that the US$12,500 identified against Non-Expendable (B/L 42.00) should be included in Budget Line 42.06 for the purchase of a vehicle in Vanuatu. This was approved by SPC and UNDP and supported by FAO, Apia.

Miscellaneous

Operations and Maintenance

Again, expenditure is below what was expected for 1994 (49.3%), but this was mainly due to the late start and the restricted nature of activities geographically in Solomon Islands and FSM.

The US$6,000 identified against Tonga should be against Budget Line 51.00, Operations and Maintenance. The over-expenditure in Western Samoa (B/L51.04) is due to vehicle running costs and registration and insurance, not specifically identified when the Budget was developed.

Sundry

This expenditure is below the expected level (56.3%). Most of the costs are related to communications. The use of PEACESAT may have kept these costs to a minimum.

SUMMARY

In summary, the expenditure has been lower than expected in all components and this can be attributed to the late start of activities in Solomon Islands and FSM and implementation problems in Solomon Islands. Rephasing of funds, when the budget is revised, will be necessary.

One change that is being developed is to increase the amount of funds advanced to the SPC Fruit Fly Imprest Account in each country. This will give UNVs and national staff more flexibility and will reduce the work load at SPC, Nabua and for the Project Assistant.

Table 7 Percentage of available funds expended during 1994 and up to April, 1995 - RAS/93/300 : Regional Fruit Fly Project (Phase II)

Budget Line	Annual Budget		Percentage Funds Expended	
	1994	1995	1994	1995 (1)
Personnel, excluding Official Travel	247,620	237,770	84.9	Not Available
Official Travel	24,950	21,650	77.7	44.7
Mission Cost (FAO)	8,000	0	51.3	0
Quar. Devel.	15,500	15,500	52.8	0
Training				
- Workshop	0	10,000	0	0
- Workplan Review	6,000	6,000	0	90.0
- Attach. Training	7,000	5,000	53.5	23.8
Equipment				
- Expendable	19,050	7,350	54.0	24.1
- Non-Expendable	71,300	2,300	82.8	86.9
Miscellaneous				
- Operations/Maint.	22,500	19,050	49.3	28.5
- Sundry	8,000	9,500	56.3	0
Total	421,920	334,120	79.1	20.8 (2)

Notes

(1) Figures taken from the Commitment Register kept by the RFFP Project Management.

(2) This figure excludes the expenditure on salaries for CTA, UNVs and Project Assistant and the Mission Costs.