TERMINAL REPORT

(MAY 1997 – DECEMBER 2000)

FAO/AusAID/UNDP/SPC
Project RAS/97/331 on:

REGIONAL MANAGEMENT OF FRUIT FLIES IN THE PACIFIC

Part 7: PROGRESS REPORTS May 1997 – Dec 2000

PROGRESS OF ACTIVITIES FOR RAS/97/331 : May 1997 – December 2000	
Expected Outputs	**Actual Outputs**
Immediate Objective 1 :	**To overcome constraints to production and export of fresh fruits and vegetables in FSM, Solomon Islands and Vanuatu caused by the presence of damaging fruit fly species.**
Output 1.1 Valid data on fruit flies and parasitoids in each country, their host ranges, seasonal abundance, and assessment of losses caused.	**May 1997-September 1998** • Completed status report on fruit flies and quarantine surveillance in Vanuatu in December, 1997. • Revised trapping programmes in Vanuatu and Solomon Islands to quarantine surveillance focus during 1997 and 1998, respectively. • Trapping and host surveys in Solomon Islands not sustained after departure of UNV. To be handed over to Quarantine with some assistance from Non-Government Organization – Solomon Island Development Trust (SIDT). Recommended 30 trap sites, made up of 12 sites in 5 Provinces in Priority 1 and 18 sites in 8 Provinces in Priority 2 sites. • Quarantine surveillance in FSM limited to Pohnpei. Traps being re-established on Chuuk, Yap and Kosrae by SPC. • Accurate information on fruit flies in Vanuatu (14 species) and FSM (1 species) • More work needed in Solomon Islands particularly on host surveys, but already recorded 57 species of which 11 are undescribed species.

Output 1.1 Continued.	**October 1998-April 1999** • Draft Status Report on fruit flies for Solomon Islands completed and Status Report for Vanuatu revised, updated and submitted to New Zealand MAF Regulatory Authority. • Appointed a replacement United Nations Volunteer Entomologist in December, 1998. • Laboratory facilities at Dodo Creek Research Station, Solomon Islands rejuvenated so that activities related to laboratory colonies, trapping, fruit surveys and heat tolerance studies of eggs and larvae can be re-activated. • ACIAR Fruit Fly Project provided representative fruit fly specimens as reference collection to Solomon Islands and Vanuatu.

Output 1.1 Continued.	**May-October 1999** • Outputs from Solomon Islands severely disrupted by political and social instability and security problems in Guadalcanal. Limited to restricted trapping and host surveys. • SIDT assisted with assessments of damage caused by fruit flies in Guadalcanal and Western Province. In Guadalcanal, damage from fruit flies resulted in losses to guava (90-100%), snake gourd (100%), Kavika (90%), papaya (50%), cucumber (18-50%), rock melon (20-50%), and mango (5-10%). In Western Province, fruit flies caused losses to carambola (60%), breadfruit (62%), snake gourd (56%), papaya (48%), Kavika (38%), banana (33%), orange (29%), and guava (26%). • Damage assessments on North Ambrym by the Farm Support Association (FSA) showed that breadfruit suffered 80-100% damage at the ripe-overripe stage and Kavika (*Syzygium malaccense*) 100% damage at all stages from colour break to fully ripe. • Trapping and host survey systems in Vanuatu now maintained almost entirely by Government. • Trapping and host surveys in FSM maintained primarily by the SPC Plant Protection Project in Micronesia, with some help of country co-operators in the States of Kosrae, Chuuk, Pohnpei and Yap.

Output 1.1	**November 1999 – June 2000**
Continued.	• Status report on Fruit Flies in FSM revised and up to date second edition published. • Revised second edition of the Status Report on Fruit Flies in Solomon Islands commenced and in good progress. • Deteriorating security conditions in Solomon Islands forced to move equipment and staff associated to SPC's Fruit Fly and Taro Beetle Projects away from Dodo Creek Station to the Malaria Centre mosquito breeding laboratory in Honiara. This is a temporary arrangement until late 2000. Space is available to house both Projects, which should remain closely linked, at the Veterinary Laboratory. • United Nations Volunteer based in Solomon Islands transferred to Fiji Islands on 13 May to finish his contract and counterpart entomologist funded by RMFFP resigned from his position. Plans underway to upgrade casual labourer to full-time technician and to hire a part-time consultant to look after fruit fly and taro beetle work. • Assessment trips to Solomon Islands by Entomologist (Fruit Flies) on 19-20 February and 6-13 May and to Vanuatu on 20-30 May. • Taxonomic revision of fruit flies in Solomon Islands and Vanuatu finalized by Prof. R. Drew and manuscript submitted for publication. Vanuatu counts 9 previously described and three new species and Solomon Islands has 39 described and 9 new species. • Solomon Islands and Vanuatu provided material to expand the regional reference collection. Pinned material from this collection will be distributed to other PICTs.

Output 1.1	**July – December 2000**
Continued.	• Second edition of status report for Solomon Islands partly completed, but major work still required. • Ecological monograph on fruit flies in Solomon Islands prepared by Dr. Robert Hollingsworth being technically reviewed by Dr. Dick Drew. • Scientific paper on host records of *B. frauenfeldi* in FSM nearly ready for submission to journal. • Activities in Solomon Islands limited to a minimum level (trapping and lab colony maintenance) in Solomon Islands by the casual labourer, who has been up-graded to full-time technician, funded by RMFFP. • Overall coordination of fruit fly activities in Solomon Islands by entomologist Dr. Brian Thistleton under a retainer consultancy (one day a week) sponsored by RMFFP. UNV transferred to Fiji Islands in May finished his contract in October. • No prospects to return to Dodo Creek Research Station in Solomon Islands, as buildings have been destroyed by fire. Fruit fly project still based at the Malaria Centre, until December 2000. Ministry of Agriculture has agreed to make veterinary laboratory available, once renovated (theoretically in late 2000).

Output 1.2	**May 1997-September 1998**
Quarantine surveillance systems/early warning systems to record introductions of exotic fruit fly species and emergency response plans to cope with any outbreak of exotic fruit flies	• Quarantine surveillance systems in place in Vanuatu and in Pohnpei (FSM), based on trapping and host surveys. See Output 1.1 for Solomon Island status. • Procedures for quarantine surveillance documented in Vanuatu – as model for other countries • No action on emergency response plans. (To be done in association with Nauru eradication exercise in late 1998.) • Fruit fly identification workshops in Brisbane (June, 1997) and in Solomon Islands (January, 1998) with ACIAR.

Output 1.2	**October 1998-April 1999**
Continued	• Discussions with Government of Solomon Islands to use Solomon Islands Development Trust (SIDT) personnel to assist with Quarantine Surveillance in the Provinces. SIDT has about 250 Village Demonstration Workers (VDWs) spread over the country. • Funding proposal for expansion to the existing limited quarantine surveillance programme developed by Solomon Islands MAF and RMFFP. To be implemented during second quarter of 1999. • Quarantine surveillance in Vanuatu and Pohnpei (FSM) continuing. Plans to re-establish trapping in Chuuk and Yap included in FSM National Counterpart's work plan for first half of 1999. • Two staff from Solomon Islands and one from each of FSM and Vanuatu received hands-on training by participating in the Nauru Fruit Fly Eradication Programme. Draft emergency response plans to cope with outbreaks of exotic species of fruit flies completed for Solomon Islands, Vanuatu and FSM.

Output 1.2	**May-October 1999**
Continued	• Quarantine surveillance, based on trapping, re-established in Western Province of Solomon Islands, particularly focussing on the Shortland Islands, adjacent to Bougainville, PNG and acting as an early warning system against unwanted incursions of Asian papaya fruit fly (*B. papayae*) from the PNG mainland. • Quarantine surveillance in Kosrae, Yap and Chuuk re-established under the SPC Plant Protection Project (Micronesia) and reporting is now part of overall quarantine effort within each State. Also maintained in Pohnpei State. • Emergency Response Plans in Solomon Islands, Vanuatu and FSM completed. Plan for FSM to be revised. • Use of NGOs such as SIDT in Solomon Islands and FSA in Vanuatu being used to help with trapping and advisory services on fruit fly control in remote islands.

Output 1.2	**November 1999 – June 2000**
Continued	• Quarantine surveillance through trapping in place in FSM (Pohnpei state: 16 sites, Kosrae: 5 sites, Chuuk: 6 sites, Yap: 6 sites), Vanuatu (Torba province: 8 sites, Penama 6 sites, Sanma: 10 sites, Malampa: 8 sites, Shefa: 21 sites, Tafea: 4 sites) and Solomon Islands (Guadalcanal province: 11 sites, Temotu: 4 sites, Choiseul: 3 sites, Malaita: 3 sites, Western: 17 sites. • Trapping established in Malaita Province (Solomon Islands) in collaboration with Malaita Development Authority. • High risk host commodities regularly sampled in Vanuatu and FSM as part of ongoing quarantine surveillance. • One staff from Solomon Islands received hands-on training by participating in the 8th Campaign of the Nauru Fruit Fly Eradication Programme, in December 1999. • ERP in FSM being reviewed by SPC Plant Protection in Micronesia Project. • Production of finalized version of Vanuatu ERP against fruit flies in good progress. • Solomon Islands ERP being used to develop a generalized ERP for all pests in Solomon Islands.

Output 1.2	**July – December 2000**
Continued	• Surveillance by trapping still maintained and stable in Vanuatu and FSM (Pohnpei). Traps in other FSM states irregularly serviced. Number of sites in each province similar to June 2000, plus extra new sites in Vanuatu, that has 67 actively serviced sites. • Trapping in Solomon Islands severely affected by crisis and consequent unrest. Trapping on Guadalcanal restricted to Honiara area (nine sites). Traps still regularly serviced in Malaita (3 sites). Trapping interrupted in Choiseul and Temotu, and traps irregularly serviced in western Province, because of staff redeployment and extended unpaid leave consequent to crisis. Surveillance gap partly overcome by good trapping network in Bougainville. • Most trapping data in Solomon Islands, covering 1994-2000, reviewed and entered in comprehensive database as Excel sheets. • High-risk commodities still regularly collected as part of surveillance in Vanuatu and FSM. • Vanuatu Quarantine (VQIS) provided major input in development of generalized ERP by SPC-PPS and Animal Health, starting from experience in developing fruit fly ERP.

Output 1.3	**May 1997-September 1998**
Environmentally sound inexpensive, effective field control systems adopted by subsistence and commercial farmers in order to increase production, food security and incomes of farmers.	• No specific activities on protein bait spray development from brewery waste yeast until research is completed in Tonga or Fiji. • Consultancy arranged to establish pilot demonstrations of protein bait spraying and bagging at village level in Ambrym in Vanuatu and on protein bait spraying for cucurbits in Western Province of Solomon Islands. Involvement of Solomon Island Development Trust network. • Assisted with introduction, rearing and release of the parasitoid *Psyttalia fletcheri* for melon fly control in Solomon Islands and *Fopius arisanus* and *Diachasmimorpha longicaudata* into Pohnpei and Kosrae respectively for control of mango fruit fly. Low levels of recovery of *P. fletcheri* and *F. arisanus* during 1997.

Output 1.3	**October 1998-April 1999**
Continued.	• Consultancy (see above) operating with report due late April or early May. Workshops with VDWs from SIDT held in Honiara and Gizo to explain the importance of fruit flies, their control and assessment of damage levels. VDWs undertaking damage assessments in villages to determine the impact of fruit flies on subsistence food security and production. • As part of the consultancy, pilot studies on damage assessment and control of fruit flies using bagging of fruits with various types of leaves and protein bait spraying set up in two remote villages in Ambrym, Vanuatu and on a commercial guava farm near Port Vila. • RMFFP staff from Solomon Islands, PNG and Headquarters were involved in the biennial Conference of about 250 VDWs sponsored by SIDT in Honiara in March, 1999, resulting in fruit fly control at the village level being including in the compulsory tasks to be performed by each VDW. • The parasitoid, *F. arisanus* , has been recovered from many sites in Pohnpei showing that it is well established. Surveys for the parasitoid, *D. longicaudata*, on Kosrae are planned for the next two months.

Output 1.3	**May-October 1999**
Continued.	• Protein bait sprays adopted by commercial guava and citrus producer (Des Park) on Efate, Vanuatu resulted in damage reduction of over 90% to less than 7%, making guava production viable. Bait spray technology resulted in first harvest of marketable fruit from farmer's 800 guava trees. • Farmers on Islands such as Futuna, Aniwa and Anatom (formerly Aneityum) are very interested in using protein bait sprays for control of fruit flies in citrus and guava, resulting from demonstration on Efate. Farmers from these islands to be brought to Efate to work on farm above to gain experience in bait spray application. • Villagers on North Ambrym in Vanuatu have tested protein bait sprays and bagging of fruits with paper bags or bags made from leaves as a means of controlling fruit flies and increasing food security. Bagging of fruits is appropriate technology. • Drafting of Pest Advisory Leaflets for fruit flies and their control for Vanuatu and Solomon Islands commenced.

Output 1.3	**November 1999 – June 2000**
Continued.	• Developed, in collaboration with UNDP-ICARE, a project called "Promotion of Income Generation Opportunities from Fruit Production in Island Communities in Vanuatu". There are two objectives: 1. Development of cheap protein bait produced locally from waste yeast conversion by Tusker Brewery (sponsored by RMFFP and ACIAR). 2. Training of farmers from Aniwa, Anatom, Futuna, Tanna and northwest Santo on fruit fly control and orchard management (sponsored by UNDP-ICARE). Trip to Vanuatu by Entomologist (Fruit Flies) on 19-30 May. Implementation workshop for the new project conducted on 22 May. • Produced and printed 1000 copies Pest Advisory Leaflets on fruit fly fauna in Vanuatu (1000 in English and 1000 in French) and fruit fly fauna in Solomon Islands (1000 copies). • Leaflet on fruit fly control in Bislama language produced for Vanuatu. • Informal demonstrations of fruit bagging to farmers done in Vanuatu and Solomon Islands. • Series of radio shows on fruit flies and quarantine awareness produced in local languages by fruit fly teams in Solomon Islands and Vanuatu.

Output 1.3	**July – December 2000**
Continued.	• Unit for brewery waste yeast conversion into protein bait purchased from New Zealand and shipped to Vanuatu in December. Bait production will soon start. • Agreement to send an engineer from Tusker Brewery for a one-week attachment to Royal Tonga Brewery in January (funded by NZODA and the Brewery) to learn about installation and running waste yeast conversion unit. • Two farmers from each of Aniwa, Anatom, Futuna, Tanna and northwest Santo islands trained at Des Park orchard, by Des, and staff from the fruit fly project staff and the Department of Agriculture, on fruit fly control and citrus and guava orchard management (sponsored by UNDP-ICARE). They will consequently improve their orchards, apply fruit fly control methods and train other farmers on their islands. • Activities interrupted in Solomon Islands due to conflict.

Output 1.4	**May 1997-September 1998**
Laboratory colonies of economically important fruit fly species for research into non-host status and quarantine treatments	• Maintained colonies of *Bactrocera cucurbitae* (melon fly), *B. frauenfeldi* (mango fruit fly), *Dacus solomonensis* in Solomon Islands, *B. trilineola, B. umbrosa* and *B.sp.near paraxanthodes* in Vanuatu. Colonies in Solomon Islands in poor state in August, 1998. • Colonies of mango fruit fly in FSM died; but have been re-established in 1998.

Output 1.4	**October 1998-April 1999**
Continued	• Colonies *of B. frauenfeldi* , *D. solomonensis* and *B. cucurbitae* rejuvenated in Solomon Islands since the UNV Entomologist arrived. Major emphasis on *D. solomonensis* rearing techniques and rate of development studies. • Colonies in Vanuatu maintained for heat tolerance testing of immature stages of fruit flies and for host status testing of fruits and vegetables for export.

Output 1.4	**May-October 1999**
Continued	• Colonies of *B. trilineola* in Vanuatu and *B. frauenfeldi* , *D. solomonensis* in Solomon Islands, and *B. frauenfeldi* in FSM have been maintained for heat tolerance research to develop quarantine treatments based on forced hot air. • Studies on rearing techniques for *D. solomonensis* were disrupted during June-September and are being continued.

Output 1.4	**November 1999 – June 2000**
Continued	• Colonies of *B. trilineola* still maintained and actively used for heat tolerance research and host status testing in Vanuatu. • Colonies of *B. frauenfeldi* , *D. solomonensis* and *B. cucurbitae* in Solomon Islands moved from Dodo Creek Station to Honiara. Colonies still maintained but no active research because of staff shortage and security problems. • Colonies of *B. frauenfeldi* maintained in Pohnpei, FSM, to breed parasitoids for biological control.

Output 1.4	**July – December 2000**
Continued	• Colonies of melon flies, mango flies and *D. solomonensis* maintained by the casual labourer in Honiara after the UNV's departure despite the crisis, a significant demonstration of commitment. • Strong and stable colonies of *B. trilineola* maintained in Vanuatu for host status testing and field control testing. • Small nucleus colony of mango flies remaining in FSM.

Output 1.5	**May 1997-September 1998**
Increased technical capacity of national staff to be able to identify fruit fly species and develop quarantine treatment based on non-host status and heat.	• Training workshops in Brisbane (June, 1997) by RMFFP and ACIAR and in Solomon Islands (January, 1998) by ACIAR. • Contact with ACIAR project for in-country hands-on training in Vanuatu in October, 1997 and January, 1998. • Host status reports on pineapple, squash and cucumbers completed in Vanuatu and submitted to NZ. Squash and cucumber data accepted at this stage. • Host status tests on limes, lemons, pineapples completed in Solomon Islands. • Heat tolerance testing for *B. trilineola* in Vanuatu underway and *B. frauenfeldi* in Solomon Islands commenced but postponed until new UNV arrives. • Discussions on a small forced hot air unit for testing 300-500kg of produce in Vanuatu in progress. Useful for small countries. To be private sector operated. • Conducted Workshop on Quarantine Treatment Development in Pohnpei (FSM) for representatives from FSM, Palau, Marshall Islands, and Guam in conjunction with SPC Plant Protection Project in Micronesia and College of Micronesia in May, 1998.

Output 1.5	**October 1998-April 1999**
Continued	• Equipment used to undertake heat tolerance studies of immature stages of fruit flies in Vanuatu repaired and is now ready for continuation of heat tolerance testing. Host status testing of chillies in Vanuatu shows that chillies are not a host for fruit flies. Data assessed by RMFFP and report to be completed by Vanuatu staff and sent to New Zealand.

Output 1.5	**May-October 1999**
Continued	• Conducted a Workshop on the Generation of Heat Tolerance Data for Immature Stages of Fruit Flies in Port Vila for three participants from PNG, two from Solomon Islands, two from Vanuatu and one from the ACIAR Fruit Fly Project in PNG on 31 October-5 November. Aim was to standardize techniques. • Equipment for carrying out heat tolerance testing of immature stages of fruit flies provided to PNG, Solomon Islands and Vanuatu after Workshop. • Vanuatu completed reports on Non-Host Status of cucumbers, chilli, squash and pineapple, none of which are susceptible to fruit fly attack and may be exported to New Zealand without quarantine treatment.

Output 1.5	**November 1999 – June 2000**
Continued	• Vanuatu completed heat tolerance testing of early and late eggs, first instar larvae and feeding and non-feeding third instars of *Bactrocera trilineola*. Data will be analyzed in New Zealand. • Heat tolerance testing in Solomon Islands not yet started because of poor electricity supply and social unrest. • Heat tolerance testing on mango fly in Pohnpei no longer in the programme. It will be done in Palau instead. • Reports from non-host status testing in Vanuatu of three varieties of cucumbers and one variety of chilli finalized and ready to be submitted to New Zealand. • One cucumber variety and 'Tahitian' limes recently tested in Vanuatu and are non-hosts to *B. trilineola*. Reports to be soon completed.

Output 1.5	**July – December 2000**
Continued.	• Of 19 crop varieties tested in Vanuatu, nine are non-hosts to *B. trilineola*. • Reports from host status testing of mango fly on pineapple and Lisbon lemon in Solomon Islands written and nearly ready to be submitted to New Zealand MAF. • Raw data from heat tolerance testing on eggs and larvae of *B. trilineola* (Vanuatu) provided to RMFFP. Statistician in New Zealand (Dr. Chris Frampton) hired with funds from NZODA on a consultancy for in depth data analysis. • Heat tolerance testing in Solomon Islands indefinitely postponed.

Immediate Objective 2:	**To improve substantially the quarantine preparedness of PICTs to cope with inevitable outbreaks of exotic fruit flies regionally.**
Output 2.1 Quarantine surveillance/early warning systems in all PICTs.	**May 1997-September 1998** • Quarantine surveillance maintained wholly by Governments in New Caledonia, French Polynesia, Guam, CNMI, Fiji, Tonga, Cook Islands. • Quarantine surveillance established and partly maintained by RMFFP in Samoa, FSM, Vanuatu, Solomon Islands. • New surveillance systems established in PNG, Niue, Nauru under RMFFP (ACIAR Project and NAQS also in PNG). • Quarantine surveillance kits comprising trapping materials, host survey supplies and instruction booklet distributed to American Samoa, Tuvalu, Tokelau, Wallis and Futuna, Palau, Kiribati, Marshall Islands and to FSM for Chuuk, Yap, Kosrae. Completed in July, 1998. • Trapping on Pitcairn Island done – *B. tryoni*, *B. setinervis* recorded.

Output 2.1	**October 1998-April 1999**
Continued	• Quarantine surveillance systems are now in place in American Samoa, Palau, Tokelau, Tuvalu, Wallis and Futuna, and Marshall Islands. Specimens have been received from American Samoa, Palau and Tuvalu.

Output 2.1 Continued	**May-October 1999** • Quarantine surveillance, based on permanent trapping systems, operational in all 22 Pacific Island countries and territories (PICTs) - American Samoa, Cook Islands, Commonwealth of the Northern Mariana Islands, FSM, Fiji Islands, French Polynesia, Guam, Kiribati, Marshall Islands, Nauru, New Caledonia, Niue, Palau, PNG, Pitcairn Island, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu and Wallis and Futuna. Intent is to have a national and regional early warning system for exotic fruit flies to protect fruit and vegetable production. • To update status of quarantine surveillance in each country, questionnaire circulated to each PICT in October 1999. • Collections of representative fruit fly species throughout the Pacific being compiled by RMFFP for distribution to each PICT as reference collections.

Output 2.1 Continued	**November 1999 – June 2000** • Quarantine surveillance through permanent trapping functional on 21 of the 22 PICTs. • Finalized and summarized on a table the quarantine surveillance status in each PICT based on a questionnaire sent to all PICTs in October 1999. • As of December 1999, number of permanent trapping sites in each country (1 Cue-lure and 1 methyl eugenol trap, unless otherwise indicated) are: American Samoa: 12 sites on 3 islands; CNMI:200 Cue-lure sites on 3 islands (in 1996); Cook Islands: 31 sites on 5 islands; FSM: 33 sites on 5 islands; Fiji Islands: 132 sites on 15 islands; French Polynesia:550 ME sites on 7 island groups and 160 Cue-lure on 4 island groups; Guam: 15 ME traps on one island; Kiribati: 5 sites on 1 island; Marshall Islands: 4 sites on 1 island; Nauru: 41 sites on one island; New Caledonia: 61 sites on 3 islands; Niue: 10 sites on 1 island; Palau: 112 ME traps on 6 islands; Papua New Guinea: 135 sites in 14 provinces; Solomon Islands: 35 sites on 9 islands; Tokelau 5 sites on one island (as of September 1998); Tonga: 25 sites on 6 islands; Tuvalu: 14 sites on 5 islands; Samoa: 35 sites on 2 islands; Vanuatu: 57 sites on 16 islands; Wallis and Futuna: 6 sites on one island. Trimedlure traps are maintained in Fiji Islands (58 sites), French Polynesia (20 sites), Guam (15 sites), New Caledonia (56 sites) and Tonga (25 sites). • Regular host fruit surveying of high risk commodities for quarantine surveillance is done in American Samoa, Cook Islands, FSM, Fiji Islands, French Polynesia, Nauru, New Caledonia, Niue, Palau, Papua New Guinea, Samoa, Tonga and Vanuatu. • Continued developing a fruit fly collection in view of distributing reference collections to PICTs that have curation facilities.

Output 2.1 Continued	**July – December 2000** • Quarantine surveillance through trapping still maintained in 21 of the 22 PICTs. • Questionnaire to update quarantine surveillance status table sent in September. Up-to-date table in preparation. • Surveys of high-risk commodities still done in the above-mentioned countries. • Trapping network in PNG downgraded from an extensive coverage for inventory and research to an essential quarantine surveillance network with traps restricted to strategic points. • Reference collection completed and housed at SPC in an air-conditioned room. It contains 3463 pinned and labeled specimens belonging to 117 species. There are representatives from Palau, FSM, Kiribati, Nauru, Tuvalu, PNG, Solomon Islands, Vanuatu, New Caledonia, Fiji Islands, Tonga, Samoa, American Samoa, Cook Islands, French Polynesia and Pitcairn. All economically important species and a large diversity of rainforest species are represented. Reference collections of about sixty species will be provided to PICTs with collection storage facilities in early 2001.

Output 2.2 Emergency Response Plans and eradication strategies to cope with outbreaks of exotic fruit fly species, in conjunction with disaster relief groups.	**May 1997-September 1998** • Emergency Response Plans (ERP) for exotic fruit flies in draft form in Cook Islands, Fiji, Tonga, FSM, Niue, American Samoa, French Polynesia, New Caledonia, Vanuatu as a result of Cairns Workshop in 1996. • Plans for national staff from each PICT that is involved in Nauru eradication programme to complete ERP for their country while in Nauru. • Appointed Entomologist (Fruit Flies) in Project to assist with formulation of country ERPs.

Output 2.2	**October 1998-April 1999**
Continued	• Including PNG, Vanuatu, Solomon Islands and FSM, 23 plant protection and quarantine staff from 17 countries and territories (American Samoa, Cook Islands, FSM, Fiji, Guam, Kiribati, New Caledonia, Niue, Palau, PNG, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu and Wallis and Futuna) have received hands-on training on fruit fly identification, the quarantine importance of fruit flies, control and eradication techniques while in Nauru for the four Fruit Fly Eradication Campaigns. As well, over 40 staff on Nauru have been trained. • Eleven countries have developed/upgraded their emergency response plans for exotic fruit flies.

Output 2.2	**May-October 1999**
Continued	• Including FSM, Solomon Islands, Vanuatu and PNG, 35 Plant Protection/Quarantine staff from 19 PICTs have received hands-on training in fruit fly eradication techniques, control methods, trapping and host surveys, and developing emergency response plans to cope with the incursion of exotic fruit flies as part of the Nauru Fruit Fly Eradication Programme (FFERAD). • By 7 December 1999, an additional three staff from PNG, one from Solomon Islands and two from SPC will receive training through the FFERAD in Nauru. • A group of six youth workers trained in protein bait spray application technology under the FFERAD and are responsible for the treatment of 'hot spots' in Nauru.

Output 2.2	**November 1999 – June 2000**
Continued	• Emergency Response Plan (ERP) completed for Fiji Islands, ready to be submitted to the government. • ERP in advanced draft form for Vanuatu, Samoa and Solomon Islands. Good ERP drafts developed for Niue, FSM, New Caledonia and Kiribati. Drafts also produced by Tonga, Guam, French Polynesia, Tuvalu and Cook Islands. • Forty-one plant protection quarantine staff from 19 PICTs (all but CNMI, French Polynesia and Pitcairn) and from SPC and New Zealand have received hands-on training on fruit fly eradication and Emergency Response Planning during the Nauru fruit fly eradication programme. • A group of Nauru Phosphate Corporation (NPC) has received training on protein bait spraying and are now responsible for treating the 'hot spots'. • CTA invited by IAEA to participate in Consultations Meeting on Technical Cooperation Thematic Planning for Fruit Fly in Vienna, on 15-19 November.

Output 2.2	**July – December 2000**
Continued	• Generalized ERP for pests and animal diseases being developed by SPC with significant input from fruit fly ERP. Training courses planned for 2001 using fruit fly ERP as case study. • ERP and dummy run covered during August refresher training course in Samoa. • In total, 41 research, plant protection and quarantine staff trained in Nauru, from all PICTs (except CNMI, French Polynesia, Pitcairn), as well as from New Zealand and SPC. • Planning underway to send Pacific Islanders for attachment in Palau to become familiar with new eradication technology that will be used in 2001. • Ten students from Nauru secondary School trained and involved in blocking and protein bait spraying in Nauru.

Output 2.3	**May 1997-September 1998**
Readily available stockpiles of traps, attractants, protein autolysate, plastic containers and insecticides necessary to commence on eradication effort quickly.	• RMFFP purchased traps; lures purchased as part of Nauru eradication campaign. To be stored in Fiji with SPC. • Initial discussions with New Zealand MAF Quality Management and Regulatory Authority to access these stocks – MOU to be developed.

Output 2.3	**October 1998-April 1999**
Continued	• With the assistance of the Crawford Fund for International Agricultural Research and the private sector in Australia, RMFFP has identified small amounts of protein autolysate, methyl eugenol, Cue-lure, and insecticide that may be left over from the Nauru Fruit Fly Eradication Programme. This may used in emergency outbreaks of fruit flies on a replacement basis. Excess chemicals will be stored at SPC, in Suva in the long-term. • Stocks of plastic containers, traps, paper bags and other supplies have been purchased and are being stored at the MAFF Koronivia Research Station in Fiji.

Output 2.3	**May-October 1999**
Continued	• No further activities - see above.

Output 2.3	**November 1999 – June 2000**
Continued	• Attractants, protein autolysate, insecticides and traps will soon be purchased and stored at MAFF Koronivia Research Station, in Fiji Islands.

Output 2.3	**July – December 2000**
Continued	• Stockpile purchased and being shipped to Fiji Islands. It will be stored at Koronivia Research Station. In total, 50 litres of Methyl Eugenol, 65 litres of Cue-lure, 1000 traps, 20 single-action sprayers and thousands of plastic containers purchased. All equipment available, including a modest stock of perishable protein autolysate.

Output 2.4	**May 1997-September 1998**
Effective, high profile regional and national public awareness programmes using videos, television, radio, posters at ports of entry and other media.	• Drafts of Pest Advisory Leaflets (PALs) on Queensland fruit fly (*B. tryoni*), *B. facialis*, *B. passiflorae* and melon fly completed. • Drafting of PALs on *dorsalis* complex, protein bait spraying and bagging of fruit in progress. • Decision taken to produce PALs on fruit flies and their control on a country basis rather than a species basis. To avoid duplication of information and recommendations on control. To be completed by December, 1998. • Manuals on fruit flies completed for Vanuatu (RMFFP) and Solomon Islands (RMFFP and ACIAR). 200 copies produced in Solomon Islands. • Discussions with UNDP and AQIS to set up Webpage for RMFFP and fruit flies in the Pacific commenced. • High quality photographs of fruit flies and damage for PALs, posters and brochures for public awareness now available. • Negotiations with SPC Media Centre on production of video on fruit flies, their quarantine and economic importance and control commenced. Video by July, 1999. • Purchase of posters on Australian fruit flies and exotics for distribution to PICTs.

Output 2.4	**October 1998-April 1999**
Continued	• Sets of 15 transparency slides of 13 fruit fly species have been duplicated so all PICTs, the ACIAR Project and the SPC Library will each receive one set for reference. • Five Newsletters on the Nauru Fruit Fly Eradication Programme produced and circulated to make the travelling public of the dangers of moving fruit around the Pacific and to keep the public and Government informed of progress.

Output 2.4	**May-October, 1999**
Continued	• Format for computerized information system on fruit flies in the Pacific developed. Format to match GPPIS and other systems in Australia and New Zealand. • Commenced developing WebPage on fruit flies in the Pacific. It will use data from information system above. • Plan to draft Pest Advisory Leaflets on fruit flies for New Caledonia, Solomon Islands, Fiji Islands, Vanuatu, French Polynesia, Samoa, Tonga, quarantine risks of fruit flies, protein bait spraying, the *dorsalis* complex of fruit flies, Queensland fruit fly, and melon fly and other cucurbit infesting flies. To be completed by 30 April 2000.

Output 2.4 Continued	**November 1999 – June 2000** • Developed a comprehensive web site on fruit flies in the Pacific. Contains 145 pages with project description, success stories, fruit fly control, country profiles, species profiles and project publications. To visit the site: http://www.pacifly.org • Web site officially launched on 28 June at SPC in Fiji Islands. • Produced and printed 1000 copies of ten Pest Advisory Leaflets on: fruit fly fauna in Solomon Islands, Vanuatu (English and French), Fiji Islands, New Caledonia (French and English), French Polynesia (French and English), on Melon fly and on fruit bagging to control fruit flies. • Draft in progress for Pest Advisory Leaflets on fruit fly control methods and fruit flies of Palau and plans to produce additional leaflets on fruit flies per country for Tonga, Wallis and Futuna, American Samoa – Samoa – Niue – Tokelau – Tuvalu (combined leaflet) and Papua New Guinea, as well as leaflets on quarantine risks and on fruit fly rearing methods. • Compiled a resource CD with over 800 photographs, plates and overheads on fruit flies. • Hired Steve Wilson (photographer from Queensland museum) on consultancy to photograph fruit flies in PNG. • Set of 15 slides covering 13 pest fruit fly species sent to all PICTs for presentations. • Plan in progress to compile and a publish a handbook on fruit fly techniques in the Pacific. • Four additional issues of the Newsletter on the Nauru Eradication programme (FFERAD News) produced and circulated.

Output 2.4 Continued	**July – December 2000** • Improved visual presentation and user-friendliness of Pacific Fruit Fly Web site. • Hired Steve Wilson (photographer from Queensland Museum) in December to travel to PNG and photograph pest fruit flies and bait spraying methods. • Very good series of slides of PNG fruit flies: 15 economic and 23 non-pest species photographed. These will be used for PAL production. • Pest Advisory Leaflet on PNG fruit flies in preliminary draft form. • Completed drafts of Pest Advisory leaflets on fruit flies in Tonga, fruit flies in Samoa, and another one on fruit flies in American Samoa, Niue, Tuvalu, Tokelau and Wallis and Futuna. • Two issues of INFOFLY-PNG produced and distributed: one on trapping and one important one on banana fly spread and bagging whole banana bunches for its control. • Three additional issues of the Newsletter on the Nauru Eradication programme (FFERAD News) produced and circulated. • High quality guide for fruit fly rearing produced by fruit fly workers in Samoa and distributed during the refresher training course in August.

Output 2.5 Improved technical capacity to identify exotic fruit fly species at a national and regional level and to undertake eradication procedures if an outbreak of an exotic species of fruit fly occurs.	**May 1997-September 1998** • See Output 1.5 and 2.2. • Eradication programme for at least melon fly and Oriental fruit fly in Nauru and on training of national staff in eradication techniques to commence in mid-October, 1998. • Conducted Regional Symposium on Eradication of Oriental Fruit Fly in Tahiti and Moorea in Papeete on 24-27 November 1997 – 14 countries involved. • Provided advice to French Polynesia on eradication of Oriental fruit fly.

Output 2.5 Continued	**October 1998-April 1999** • Preparations are in place to assess the feasibility of eradication of Oriental fruit fly from Palau. A visit to Palau is planned for mid-May, 1999. • Continued inputs to the Nauru Fruit Fly Eradication Programme and the training associated with it. Four campaigns of blocking with male lures plus Fipronil have been conducted – October, December, January-February, and late March, 1999. In the first two campaigns methyl eugenol plus Fipronil was used on the fibreboard block. In January-February and March, Cue-lure and methyl eugenol in a ratio of 2:1 was used. • Results of the eradication programme using male annihilation look promising, e.g., Oriental fruit fly has not been trapped for 13 weeks or recovered from fruit samples for 17 weeks; mango fruit fly trap numbers have decreased to about 5 flies per trap per week from 1,000-6,000 per trap per week; children and people in Nauru have been able to eat ripe mangoes, undamaged by fruit flies since early December. • The Nauru Government has drafted an Agricultural Quarantine Bill which is before Parliament and are seriously considering the establishment of a small Plant Protection and Agricultural Quarantine Service to police the legislation. • For details regarding training on eradication techniques provided to national plant protection and quarantine staff and the development of emergency response plans – see Output 2.2.

Output 2.5	**May-October 1999**
Continued	• Agricultural Quarantine Bill passed by the Nauru Parliament, allowing restrictions to be placed on the importation of fresh fruits and vegetables and other agricultural commodities. • Neither Oriental fruit fly nor melon fly recorded in traps or in fruits since January 1999. Nauru to be declared free from these species by 1 December 1999. • Pacific fruit fly (*B. xanthodes*) in extremely low numbers and eradication in early 2000 is predicted. • Mango fly numbers reduced significantly. FFERAD for this species continuing. • Completed a Feasibility Study on the Prospects of Eradication of Oriental Fruit Fly and Breadfruit Fly in Palau for the Government of Palau between June-September 1999. Estimated costs about USD1.2 million. • Participated in discussions with the Governments of Guam and Northern Mariana Islands on prospects for eradication of melon fly from these countries. Visit to Vienna to International Atomic Energy Agency to encourage its involvement in the Sterile Insect Technique needed in this programme.

Output 2.5	**November 1999 – June 2000**
Continued	• Four blocking campaigns for fruit fly eradication conducted in 30 November – 3 December (8th campaign), 4-5 February (9th), 11-12 April (10th), 8-16 June (11th). December campaign included training of 3 staff from PNG, one from Solomon Islands and two from SPC. Most blocking on campaigns 9-11 done by fruit fly staff at the Department of Industry and Economic Affairs and Nauru Phosphate Corporation (NPC). • Starting in December 1999, Cue-lure and methyl eugenol incorporated in separate blocks for male annihilation in Nauru. • Nauru officially declared free on Oriental fruit fly and melon fly on 6 December. Pacific fruit fly (*B. xanthodes*) has not been trapped since early February. Mango fly (*B. frauenfeldi*), still trapped every week in very small numbers (0.05 flies/trap/day) in 4-5 hot spots. Intense protein bait spraying applied around the hot spots. • Nauru government has nominated four government quarantine staff as quarantine officers. These will be trained by the Plant Protection in Micronesia project in Pohnpei in August 2000. • Consultant Andrew McGregor completed and published a socio-economic feasibility study of the eradication of Oriental fruit fly and breadfruit fly from the Republic of Palau, and a review of the economic feasibility of eradicating melon fly from Guam and CNMI, based on an assessment trip in April. • Difficulties in obtaining fly reduction in eradication campaigns against Oriental fruit fly in French Polynesia. • Trip by CTA and Entomologist (Fruit Flies) to Tahiti on 29 March – 1st April for technical assessment of the Oriental Fruit Fly eradication programme. Report and recommendations produced. • Negotiated with Aventis CropScience (Rhône-Poulenc) to provide free of charge enough papier mâché blocks pre-treated with methyl eugenol and Fipronil (new technology) to carry out two full campaigns in Tahiti and Moorea. • Arranged for a refresher course on fruit flies to take place in August 2000 in Samoa for participants from Samoa, American Samoa, Tonga, Niue, Cook Islands and Tuvalu.

Output 2.5	**July – December 2000**
Continued	• Three blocking campaigns for fruit fly eradication in Nauru conducted in 8-9 August (12th campaign), 4-7 and 9-10 October (13th campaign), and 4-6 December (14th campaign). August campaign included training of 2 staff from AgriQuality New Zealand. Ten students from Nauru Secondary School involved in campaigns 13-14, besides the usual involvement of Departments of Works, of Youth Affairs and of Industry and Economic Development and Nauru Phosphate Corporation (NPC). • Introduced in the 12th Nauru Campaign the use of ten single action sprayers to spray spots of 15 ml of protein bait mixture. This will allowto distribute bait more evenly with more operators than with three knap-sack sprayers. Twenty small sized bait spray zones defined to control amount of bait applied and concentrate on hot spots. • Nauru fruit fly eradication programme moved to new building in September. • Introduced in the 14th Nauru campaign the use of papier mâché blocks pre-treated with Cue-lure and Fipronil - a new technology developed by Aventis CropScience. These light weight blocks contain a minimal amount of attractant and are tied, no longer nailed, to trees. • Pacific fruit fly (*B. xanthodes*) officially declared eradicated from Nauru during CRGA meeting on November 20. Last specimens trapped in February 2000. As a precautionary measure, methyl eugenol blocks applied until campaign 14. • Mango fly still subsists and is trapped in small numbers every week in Nauru, despite efforts for its eradication. Decision will be taken in late 2000 about whether of not to continue eradication campaigns.

	• Trip for review of eradication programme in Nauru by Allan Allwood in September (consultancy). Report produced with recommendation and technical report on eradication programme (1998-2000) compiled and released. Main recommendation is to continue eradication campaigns against mango fly and to re-assess the programme in late 2000, once the Quarantine Service is active. • Visit and discussions in Nauru in August by the Head of SPC Plant Protection Service (Dr. Mick Lloyd), the Coordinator of Plant Protection in Micronesia Project (PPM) (Mr. Konrad Englberger) and RMFFP coordinator about the establishment of Quarantine Service. Nauru now included in SPC-PPM. Nauru government has officially gazetted and established a quarantine inspection service. Four quarantine inspectors on duty. • Project coordinator traveled to Tahiti with Allan Allwood (hired as a consultant by Aventis CropScience) on October 21-28. Papier mâché blocks treated with Methyl eugenol and fipronil introduced and applied as a new eradication technology. Enough blocks for two full campaigns provided free of charge by Aventis to French Polynesia. Conducted seminars with extension officers to introduce the new blocks and demonstrate protein bait spraying with Fipronil gel. Aerial drop tests of blocks by helicopter conducted. • Visit to Palau by Assistant Entomologist on 13-25 July for technical backstopping and discussions for planning the eradication programme. • Visit to Palau in December by assistant Entomologist for technical backstopping and to prepare for implementation workshop for initiation of the eradication programme. Papier mâché technology will be used in the Palau eradication programme. Implementation workshop planned for January 2001. • Assessment trip on 17-21 August by SPC-PPS plant pathologist (Dr. Jacqui Wright) and Mr. Nakabuta Teuraria (Kiribati Plant Protection Officer) to Butaritari Atoll, Kiribati. Purpose of trip was to determine the causing agent of destructive breadfruit disease and if there is a potential vector role by mango fly. Concluded that the disease is caused by *Colletotrichum* fungus and that there is no correlation between fruit fly infestation and the disease incidence.

Output 2.6	**May 1997-September 1998**
An upgraded, expanded database on fruit fly species in the PICTs, their host ranges, parasitoids, seasonal abundances and levels of damage caused by fruit flies.	• Negotiated with Queensland Department of Primary Industries for release of database for Fiji, Tonga, Samoa, Cook Islands, Vanuatu, Solomon Islands, FSM. • Memorandum of Understanding between RMFFP (Pacific Community) and Griffith University regarding database on fruit flies being discussed. • Vanuatu, Fiji, Solomon Islands, Tonga, Samoa, Cook Islands, FSM and PNG using EXCEL spreadsheet for recording data nationally. • Status report on fruit flies completed for Vanuatu and FSM, in draft form for Solomon Islands, and being compiled in Fiji, Tonga, Samoa, Cook Islands. Status reports to be used as basis for quarantine negotiations.

Output 2.6	**October 1998-April 1999**
Continued	• Production of status reports on fruit flies for Cook Islands, Fiji, Tonga, Samoa and Solomon Islands continuing. • Negotiations on editorial role on fruit flies for the Global Pests and Plant Information System (GPPIS) with FAO, Rome underway with the view of adding a substantial amount of the data on Pacific fruit flies to the GPPIS.

Output 2.6	**May-October 1999**
Continued	• See Output 2.4 for progress.

Output 2.6	**November 1999 – June 2000**
Continued	• Host survey data for Fiji Islands thoroughly analyzed and data generated on damage impact of fruit flies on each host species. • Completed Status Report on Fruit Flies in Fiji Islands and FSM (2nd Edition). Updating of Solomon Islands and Vanuatu Status Reports in progress. • Compiled a comprehensive database on fruit fly distribution and host records in all PICTs, with references for host records known in each country. • Information from database partly released in the Pacific Fruit Fly WEB Http://www.pacifly.org • Negotiations in progress with FAO for editorial role by RMFFP for entries on fruit flies in the PICTs for GPPIS, which is being converted into ECOPORT database. • Editorial Committee being established for assessment of material to be released on web site and ECOPORT: Allan Allwood, Luc Leblanc, Ema Tora Vueti, Dick Drew.

Output 2.6	**July – December 2000**
Continued	• Upgraded and improved database on Pacific fruit fly distribution and host records in all PICTs. Discussed with SPC Information Officer (Richard Vernon) about process of converting the database from Excel spreadsheets to an Access interactive database, which will become available (previously published host records) in the Pacific Fruit Fly WEB site. • Final edition of Status Report for Fiji Islands completed and ready for release. • Second Edition of Solomon Islands Status Report nearly completed. • Status Report on fruit flies in Tonga in progress.

Immediate Objective 3:	**To enhance production and export of fresh fruits and vegetables regionally in order to increase farmers' incomes and to assist in providing food security, particularly in those countries not included in the previous fruit fly project**.

Output 3.1	**May 1997-September 1998**
An assessment of effects of transfer and adoption of fruit fly control in sustaining livelihoods in PICTs.	• Consultancy to carry out study on the value of fresh fruit and vegetable production at the subsistence level and the impact of increases in fruit and vegetable production on poverty and the rural labour market, commenced in September, 1998. • Identified sample countries for consultancy - Vanuatu, Solomon Islands, Fiji, Tuvalu, Samoa. • Pest Advisory Leaflets production – See Output 2.4 • No PEACESAT 'FLYNET' sessions run in early 1998 due to difficulties in access to sites. Recommenced in April, 1998, but limited number of countries. • Need to identify an alternative method of communications, apart from email. Maybe tele-conferencing or new satellite system. • Proceedings of the Symposium on Regional Management of Fruit Flies in the Pacific released 52 papers; 22 of which were written by national staff. Released in October, 1997. Already out of print. ACIAR to do another run.

Output 3.1	**October 1998-April 1999**
Continued	• Consultant for above consultancy currently compiling report on data on levels of damage caused by fruit flies and benefits of fruit fly control technology to subsistence fruit and vegetable production, collected in Solomon Islands, Vanuatu, Fiji and Nauru. • Linkages with Non-Government Organizations, e.g., SIDT, improved to foster adoption of control techniques for fruit flies.

Output 3.1	**May-October 1999**
Continued	• Comprehensive report from above consultancy by Dr Andrew McGregor in final stages and to be completed by end of November 1999. • Planning commenced for International Symposium on the Management of Fruit Flies in February 2001. • Extension activities with NGO groups in Vanuatu and Fiji result in adoption of protein bait spraying at the commercial level and bagging of fruits at the village level, respectively. Similar response to control techniques in Palau as a result of conducting two seminars on management of fruit flies for up to 25 people from a wide range of backgrounds.

Output 3.1	**November 1999 – June 2000**
Continued	• Hired professional editor for a consultancy to edit, publish and print Andrew McGregor's "Socioeconomic evaluation of the Regional Fruit Fly Projects". • Ran the Third Steering Committee Meeting on 9-10 February at Tanoa Hotel, Nadi. 21 participants attended from SPC, UNDP, AusAID, FAO and 11 PICTs. A comprehensive report with recommendations has been produced.

Output 3.1	**July – December 2000**
Continued	• Andrew McGregor's "Socioeconomic evaluation of the Regional Fruit Fly Projects" published and 1000 copies printed. • Ran a combined fourth Steering Committee meeting and terminal review of the RMFFP at Raffles Gateway Hotel, Nadi, Fiji Islands, on November 21-23, 2000. 21 participants attended from SPC, UNDP, FAO, AusAID, American Samoa, Cook Islands, Fiji Islands, French Polynesia, Kiribati, Nauru, New Caledonia, Palau, Papua New Guinea and Vanuatu. Two external reviewers: Dr. Gordon Hooper and Dr. Roger Vargas.

Output 3.2	**May 1997-September 1998**
Transfer of technology related to fruit flies and methods of trapping, host surveys, laboratory rearing of flies and parasitoids, host status testing, heat tolerance testing of immature stages and field control.	• One field demonstration of protein bait spray technique in Fiji (Sigatoka Valley) in July, 1997. • Modification of waste yeast for protein baiting based on Tongan procedure continued in Fiji. Tests on guava to be done in March-April. • Field testing of Royal Tongalure on capsicum in Tonga gave excellent results - commercially released in March, 1998. • Discussions on generic heat treatments held with NZ MAF Regulatory Authority – concept accepted. • Forced hot air treatments for papaya, fresh and pickling mangoes, eggplant for Fiji. Breadfruit tested in February, 1998 and is likely to be cleared. • Heat tolerance data from Tonga and Samoa (done by NZ Hort+Research) accepted by NZ. • Cook Islands obtained clearance for heat treatment of mangoes under generic concept. • Hot forced air facility in Tonga certified for export of papaya to New Zealand. Facility established in New Caledonia by Government and private sector. • Vanuatu has clearance to export squash and cucumbers under non-host status. Need to document quarantine pathway.

Output 3.2	**October 1998-April 1999**
Continued.	• Prospects of exporting Royal Tongalure for fruit fly control to Fiji and Niue being investigated. • Confirmatory tests of quarantine treatment for breadfruit in Fiji completed in March, 1999. Quarantine pathway for export to New Zealand being considered. • CTA undertook an audit on the forced hot air treatment and associated quarantine pathways on behalf of the Nature's Way Co-operative (Fiji) Ltd., in conjunction with MAFF, Fiji, and presented report to a meeting of the two groups in February, 1999. Findings being implemented. • In Fiji, quarantine treatment using forced hot air developed for breadfruit to New Zealand. • Value of Fiji exports of papaya, mango and eggplant to New Zealand now worth FJD2.15 million in 1996-98. • Tonga's squash exports to Japan worth TOP6.3 million and Cook Island's papaya exports to New Zealand valued at NZD250,000 in 1998. • Confirmatory tests for forced hot air treatment of papaya into Australia completed and data submitted to Australian regulatory authority for technical assessment.

Output 3.2	**November 1999 – June 2000**
Continued.	• Conducted in Nadi, Fiji Islands, confirmatory tests on High Temperature Treatment of papayas in February and May in view of submitting results to AQIS Australia. Reports soon to be submitted to AQIS. • Produced a technical report on heat treatment in Fiji Islands. • Carried out non-host status testing on zucchini in Fiji Islands. • Breadfruit cleared by Fiji MAFF for export to New Zealand with HTFA treatment. Exports to commence soon. • Fernando Sengebau (fruit fly worker in Palau) on attachment training in Suva in February on fruit fly rearing and surveillance methods and on confirmatory tests for HTFA treatments. • Established colonies of mango fly in Palau for host status testing and heat tolerance research. • Fruit fly entomologist from Tonga (Tuipulotu Langi) sent to Samoa in April for attachment training on rearing techniques for *Bactrocera kirki*. • Staff in Tonga re-establishing colonies of *B. kirki* for heat tolerance testing on *B. kirki*. • Assessment trips to Samoa and Tonga by Assistant Entomologist (Fruit Flies) on 13-20 May.

Output 3.2	**July – December 2000**
Continued.	• Ran a refresher training course on fruit fly management in Samoa in August. Participants from Samoa (26), American Samoa (2), Tonga (1), Cook Islands (1), Tuvalu (1), Tokelau (1) and Niue (1). • Handbook on fruit fly rearing produced by fruit fly staff in Samoa and used as reference guide during the August refresher training course. • Royal Tongalure exported to Fiji Islands and used by farmers to control fruit flies. • Results from confirmatory HTFA treatment tests on papaya in Fiji Islands officially submitted to AQIS. • Carried out non-host status testing on capsicum, ripe chillies, bittergourd and jakfruit in Fiji Islands, and rambutan, abiu, durian and green mangoes in Samoa. • Fernando Sengebau (fruit fly worker in Palau) on attachment training in USDA-ARS laboratories in Hilo, Hawaii, on fruit fly rearing, heat treatment research and biological control, in August. • Attachment training in December at Koronivia Research Station for Geoffrey Oliouou (Solomon Islands) and Albert Arbedul (Palau). • Colonies of *B.* dorsalis and *B. frauenfeldi* established in Palau for host status testing on betel nuts and for heat tolerance research. • Difficulties in establishing colonies of *B. kirki* in Tonga.

Output 3.3 Reduced losses caused by fruit flies at subsistence and commercial levels of production due to adoption of protein bait spraying regionally.	**May 1997-September 1998** • Recommended bait spray trial at village level in Niue to test the effectiveness of destruction of fallen fruits and protein bait spraying – To be done in second half of 1998 due to shortage of fruits caused by drought. • Completed testing of Royal Tongalure on capsicums in 1997. Untreated plots 97-100% damage treated plots less than 10% damage. Royal Tongalure released commercially. • As part of consultancy in Output 3.1, field pilot studies on protein bait spraying in Solomon Islands and Vanuatu and on bagging techniques in Solomon Islands, Vanuatu and Fiji planned to commence in September, 1998. Focus is to test level of adoption of technology and estimate increases in production of various fruits.

Output 3.3	**October 1998-April 1999**
Continued.	• Trial in Niue did not show anticipated results and is to be repeated once the report on the demonstration trial is received from the Niue Government and assessed by the CTA. • Emphasis has been placed on recommending and actively encouraging, through demonstration, the bagging technique for fruit fly control, particularly at the subsistence level of production in FSM, Vanuatu, Solomon Islands, Fiji, Niue, American Samoa and Samoa. • Staff from 17 countries received training in protein bait spray and bagging techniques for fruit fly control during the Nauru Fruit Fly Eradication Programme, with the view of encouraging adoption of techniques on return to their respective countries.

Output 3.3	**May-October 1999**
Continued.	• 35 staff from 19 PICTs now have received hands-on training in protein bait spraying and bagging of fruits for fruit fly control during the Nauru FFERAD.

Output 3.3	**November 1999 – June 2000**
Continued.	• Registration of Fipronil in Fiji Islands, Tonga and Samoa for protein bait spraying.

Output 3.3	**July – December 2000**
Continued.	• Fipronil has been registered for commercial use in Fiji Islands and for experimental use in Tonga and Samoa. • Fipronil gel about to be introduced for demonstration and trial in Fiji, Tonga, Samoa, Vanuatu and PNG. Delays in its introduction to PICTs due to slowness in registration process for commercial use in Australia. • 41 staff from most PICTs, SPC and New Zealand have received hands-on training in the use of newly developed Fipronil gel in protein bait spraying for fruit fly control. • Demonstration of protein bait spraying using fipronil gel in French Polynesia in October 2000.

Output 3.4 An inexpensive, locally available protein manufactured by national breweries or other private companies from brewery waste in Fiji, Samoa, Vanuatu, Solomon Islands and PNG.	**May 1997-September 1998** • Work completed in Tonga and product to be released in March, 1998. • Research on conversion of waste yeast from Fiji Bitter Brewery continuing. • In interim, Fiji growers and exporters want to import Tongalure for fruit fly control in export crops because of price advantage. • Vanuatu Brewery interested in process.

Output 3.4 Continued.	**October 1998-April 1999** • No new work has been done on this area of bait spray development between October, 1998 and April, 1999. • Testing of a formulation of Fipronil as an insecticide to replace malathion for protein bait spraying commenced as part of the Nauru Fruit Fly Eradication Programme. This is being done with the Crawford Fund for International Agricultural Research and Rhône Poulenc (Rural) Australia. The formulation involves a thickener to improve the adherence of the bait to leaves particularly during wet weather and also to improve the effectiveness of the bait.

Output 3.4 Continued.	**May-October 1999** • Testing of the new insecticide Fipronil as the toxicant in protein baits and the male annihilation technique in Nauru and Australia has proven very successful. The new formulation for protein bait sprays includes a xanthane gum that results in a very thick bait that adheres to leaf surfaces even under very heavy rainfall. • Plans in place with farmers to test the new formulation in Vanuatu, Fiji, and PNG. • The Tusker Brewery in Vanuatu agreed to modify waste yeast to protein bait for controlling fruit flies (similar to that in Tonga), as an protein additive to animal feed and so as to reduce environmental pollution by discharging about 800 litres of waste yeast into the ocean.

Output 3.4 Continued.	**November 1999 – June 2000** • Fipronil-xanthane gum formulation for protein bait spraying used weekly in Nauru with very good results. • Fiji MAFFA conducted preliminary trials of conversion and field testing of protein bait from waste yeast from Carlton Brewery. • Waste yeast conversion soon to commence in Vanuatu (see output 1.3).

Output 3.4 Continued.	**July – December 2000** • Royal Tongalure exported to and used by farmers in Fiji Islands while research underway for waste yeast conversion in Fiji. • Vanuatu Tusker Brewery has received unit for waste yeast conversion. Engineer will receive hands-on training at Royal Tonga Brewery in January, sponsored by NZODA through RMFFP and by Tusker Brewery.

Output 3.5 Regional database on the heat tolerance of fruit fly species with the aim of formulating generic heat treatments to cope with a range of fruit fly species and commodities.	**May 1997-September 1998** • No formal activities on establishing database, except for preliminary discussions with NZ and USDA-ARS, Hawaii on a MOU. • Concept of generic or recipe heat treatments accepted by NZ MAF Regulatory Authority.

Output 3.5	**October 1998-April 1999**
Continued.	• MOU on information exchange and collaborative work on fruit flies with the USDA-Agricultural Research Service Laboratories in Hilo, Hawaii negotiated. Heat tolerance database is only one of a number issues for discussion. Others include technical advice and new techniques for eradication of Oriental fruit fly in Palau, alternatives to malathion as the toxicant in protein bait sprays, and 'generic' or recipe quarantine treatments for fresh fruits and vegetables.

Output 3.5	**May-October 1999**
Continued.	• Workshop on Generation of Heat Tolerance Data of Immature Stages of Fruit Flies in Vanuatu promoted the harmonization of procedures for this activity, with the view of setting up more generic quarantine heat treatments across the Pacific.

Output 3.5	**November 1999 – June 2000**
Continued.	• Heat tolerance results on *B. trilineola* to be soon analyzed and compared to heat tolerance of other species. • CTA traveled attended workshop in Hawaii on Review of USDA-ARS research programme on exotic pests, fruit flies and quarantine on 22-28 January. Discussed support for fruit fly research in the Pacific, and especially Palau. • Palau Government to receive technical and financial assistance to carry out heat tolerance studies on immature stages of *B. frauenfeldi* from USDA-ARS Pacific Island Basin Research Centre in Hilo, Hawaii. The RMFFP is setting up laboratory and fruit fly colonies. This was initiated by the CTA in August 1999. • Palau Government has approved the allocation of USD 1 Million to initiate Oriental fruit fly eradication.

Output 3.5	**July – December 2000**
Continued.	• Attachment training of Fernando Sengebau (Palau) in Hawaii in August on heat tolerance research as part of RMFFP agreement with USDA-ARS. • Heat tolerance data on *B. trilineola* in Vanuatu analyzed by consultant statistician in New Zealand (Dr. Chris Frampton). Results will be submitted to MAF Regulatory Authority.

Immediate Objective 4:	**In cooperation with ACIAR, to develop a separate multi-disciplinary fruit fly programme to address the enormous risk of fruit fly spread through and from PNG into the rest of the region.**

Output 4.1	**May 1997-September 1998**
Increased knowledge of the species of fruit flies and their parasitoids in PNG, particularly adjacent to the Irian Jaya border, and of quarantine risks of these species to the rest of the PICTs.	• Established quarantine surveillance in the East New Britain area, by basing a UNV Entomologist there and setting up trapping and host surveys. • Trapping systems established in Buka, Manus Island, New Ireland, Lihir, East and West New Britain, Lae, Bulolo and Wau**.** • Supplied traps to the Post Moresby area in support of the NAQS Programme. • Provided two staff with training on fruit fly identification in Brisbane. See Output 1.5. • Conducted with ACIAR, an Implementation Workshop on Fruit Fly Projects in PNG in August, 1997 and a Planning Workshop on 15-16 June, 1998. • Recruited and funded two national Junior Scientific Officers with DAL (later with NARI) to be located initially at LAES for training and then to be located at Bubia, Lae and LAES, Kerevat. Third JSO to be recruited for Laloki by December, 1998. • Publication of a practical guide for fruit fly surveying in PNG released. • Produced newsletter 'Infofly PNG' for wide distribution to government and private sector every two months. • Produced audiotape on fruit flies, their importance and control in pidgin for radio stations in PNG. • Translated Pest Advisory Leaflet on mango fruit fly into Pidgin.

Output 4.1	**October 1998-April 1999**
Continued.	• 83 pairs of Cue-lure and methyl eugenol traps have now been set up in eleven Provinces by combined efforts of RMFFP and ACIAR Project. These have been serviced every two weeks and flies submitted to Prof. Dick Drew, Griffith University, Brisbane for identification and data input to a Microsoft Access database. • Identifications provided by the ACIAR Project showed that, up to December, 1998, 95 species of fruit flies were recorded – 68 species were known and 27 species were new to science (two species belonging to the genus Dacus and 25 belonging to the genus Bactrocera) (Clarke, A. R. and Drew, R. A. I. Six Monthly Report to ACIAR on Project CS2/96/225 : 1 July – 31 December, 1998). • Survey of coffee growing areas in Highlands, establishment of trapping sites and identifying occurrence of Asian papaya fruit fly (*B. papayae*) with NARI staff. • Funds were provided to NARI in October, 1998 for the recruitment of a third Junior Scientific Officer. This person is being recruited for the Laloki laboratory and activities. • Production of the 'Infofly' Newsletter continued and a short video was produced on fruit flies and various control methods appropriate to PNG. • Plans are in place to plug a hole in quarantine surveillance by establishing traps on Bougainville in late April-early May, 1999. To be done as part of UNDP Programme of rehabilitation.

Output 4.1	**May-October 1999**
Continued.	• 140 permanent trapping sites established in 14 Provinces, each site consisting of two traps, one with cue-lure and one with methyl eugenol. • Snapshot surveys of fruit flies done in West New Britain, New Ireland, Lihir, Manus, Madang, East Sepik, West Sepik and the Highlands. • National staff able to identify a large proportion of trapped and reared fruit fly specimens. Despite this, fly specimens sent to Griffith University for identification and input into Access Database. • 99 of the 180 described species of fruit flies in PNG collected in trapping programme. • Distributions of species now better known than at start of programme in 1997, e.g., Asian papaya fruit fly is present in mainland PNG but not in the Island Provinces and melon fly is widespread, but does not occur in Manus. • Collections of 2,443 samples of edible and wild fruits resulted in 34.2% of samples yielding flies. 14-15 pest species were reared from commercial/edible fruits. • Three parasitoids (*Fopius deeralensis*, *Psyttalia fijiensis*, *Diacasmimorpha kraussi*) recorded from fruit flies in East New Britain. • Large reference collections of pinned fruit flies specimens established at Kerevat (3,975 pinned specimens comprising 55 species), Bubia and Laloki. • Trapping and host survey data recorded on EXCEL spreadsheets at each laboratory.

Output 4.1	**November 1999 – June 2000**
Continued.	• There are 111 trapping sites, with one Cue-lure and one methyl eugenol trap, in 14 provinces: Western (7 sites), Central (46 sites, but reduced to 11 sites in March), Morobe (16 sites), Madang (10 sites), East Sepik (4 sites), West Sepik (5 sites), Eastern Highlands (6 sites), Simbu (4 sites), Western Highlands (5 sites), Milne Bay (9 sites), West New Britain (5 sites, not serviced), East New Britain (22 sites, but reduced to 10 sites in March), New Ireland (6 sites, not serviced), Lihir (1 site), Manus (4 sites, not serviced), Bougainville (8 sites). Sites in New Ireland, West New Britain and Manus not presently serviced. Requested quarantine to resume assistance in servicing traps. Trapping in Central Province reduced in early March to fewer sites, mostly around Port Moresby, for quarantine surveillance. Trapping also reduced in East New Britain. • Most trapped fly samples sorted at Griffith University, Brisbane. As of late 1999, 115 described and well over 30 new species had been recorded by trapping. Two sites sorted by fruit fly team in Bubia, three sites in Kerevat and four sites in Laloki. Trapping data sorted at station level has not been incorporated into Griffith University database. Detailed distribution available on the WEB site: http://www.pacifly.org/Country_profiles/species_PNG • Banana fly (*B. musae*) trapped for first time in 1999 in East New Britain, but banana infestations reported by farmers following the September 1994 volcanic eruption. Bananas brought from Mainland as food aid suspected to be the cause of introduction. Banana fly reared from heavily infested ripe bananas. Snap shot surveys of East New Britain (January to June) confirmed that banana fly is spreading, with hot spots around Rabaul town. • Survey of Buka and Bougainville by helicopter in February. It is a high risk area because lots of material carried into Bougainville from other PNG provinces. Eight permanent trapping sites established. Strong linkages with UNDP Bougainville rehabilitation Project, Cocoa and Coconut Research Institute and Provincial DPI for trap maintenance. Presence or absence of *B. musae* to be confirmed at Griffith University. • Survey trips to Western Province (October 1999), Madang (January –February and 18-23 June), the Highlands (February), and Milne Bay (March) for trap establishment and maintenance and host fruit surveying. Trips to Oro and Gulf Provinces planned before the end of the year.

	• Border market surveys carried out in Western Province to document movements of fruits from Mainland to Daru. • Heavy damage by *B. musae* on banana in the Highlands, especially in Simbu. *B. papayae* widespread throughout the Highlands, but no reports of infestations of coffee berries. *B. papayae* however trapped in increasingly large numbers in the Highlands. Fruit fly infestations on citrus (mandarin, orange, grapefruit) limited in the Highlands. • Comprehensive report, with trapping and host survey results, produced by national staff after each survey trip. • Negotiations in progress with Quarantine (NAQIA) so they progressively take over quarantine surveillance. • General host fruit surveying is still actively done, and high risk commodities are regularly sampled for quarantine surveillance. 1353 samples collected by Bubia (as of late March). 1419 samples in bulk and 4552 fruits set up individually in East New Britain (late March). 941 samples set up in bulk and over 5000 set up individually for damage assessments in Laloki (as of early May). Data from host fruit surveys kept up-to-date in Excel spreadsheets at all three Centres. National staff manage the data entirely themselves. • Hired photograph Steve Wilson to travel to Papua New Guinea to photograph pest and non-economic fruit fly species. Photos will be used for the production of a large leaflet on PNG fruit flies.

Output 4.1	**July - December 2000**
Continued.	• Trapping network considerably reduced to essential surveillance network by discontinuing most of the non-essential sites that have been continuously maintained for over 15 months. • Meeting on 18-23 July at Griffith University, Brisbane, between ACIAR, NARI (research) and NAQIA (quarantine) resulting in agreement that most trapping will be operated by NAQIA by January 2001 and that ACIAR will continue involvement in sorting sample collected by NAQIA. • ACIAR Project at Griffith University continue managing trapping result database with up to date versions sent to RMFFP regularly. • Host fruit surveying continuing at the three Centres. • Market surveys conducted by the three Centres to assess damage on fruits sold in public markets. • Comprehensive host records on database Excel spreadsheets entirely managed by the Junior Scientific Officers. • Survey trip to Buka and Bougainville on 25-31 October, in close collaboration with UNDP Bougainville Rehabilitation Project. 8 trapping sites maintained. • Survey trip to West New Britain (7-11 August) and three permanent trapping sites reactivated. • Survey trip and establishment of permanent trapping sites in Oro Province (8-14 July): six new trapping sites established and host fruits sampled. *B. papayae* not trapped. • No evidence of Asian papaya fruit fly attacks on coffee berries in the Highlands. • Extensive survey in East New Britain to determine distribution of banana fly, which causes considerable damage around Rabaul. Four snap-shot surveys conducted between June and October 2000. All flies sent to Prof. R. Drew in Brisbane to confirm identity of *B. musae.* • Visit in December by RMFFP Coordinator and Allan Allwood (consultancy) to assess banana fly situation in East New Britain and carry out a feasibility study of its eradication. • Pest Advisory Leaflet on fruit flies in PNG in draft form.

Output 4.2	**May 1997-September 1998**
Dedicated facilities for undertaking fruit fly research at Bubia Research Station (Lae), Kerevat (New Britain) and at Laloki (Port Moresby)	• Buildings at Kerevat (Lowland Agricultural Experiment Station (LAES)) and Bubia modified as fruit fly laboratories. • Buildings at Laloki assessed by the UNV for renovations and modifications. Modifications to be completed by 30 November, 1998. • Supplies (traps, lures, plastic containers, rearing materials) and equipment (computers, refrigerators, cameras) provided to laboratories.

Output 4.2	**October 1998-April 1999**
Continued.	• Modifications at the Laloki laboratory have not been completed because the RMFFP is still waiting for a quotation for renovations. • At LAES, Cocoa and Coconut Research Institute finally vacated two office/laboratory areas that are being modified into a new rearing laboratory and general laboratory and office for fruit fly work. This will allow work on the development of heat tolerance data on immature stages. • The laboratory at Bubia is to be officially opened at an Open Day that will be jointly sponsored by the RMFFP, ACIAR Project, NARI and the PNG Government on 22 April, 1999.

Output 4.2	**May-October 1999**
Continued.	• Laboratory at Bubia not officially opened because of dispute between NARI and DAL. The laboratory is fully operational, however. • Laboratory at Kerevat has been slow to reach full operations, due to power inadequacies and lack of air-conditioning in the critical fruit fly rearing room. • Laboratory at Laloki has not been modified due to security problems and the requirement for fencing the property to improve security. There seems to be a reluctance to fence the property despite offers by the ACIAR Project to fund it. This laboratory has been broken into by 'rascals' twice recently, with considerable losses of equipment.

Output 4.2	**November 1999 – June 2000**
Continued.	• Facilities have been now fully refurbished and functional in Kerevat and Bubia. Funds transferred in May for refurbishing and securing the facility in Laloki. • All three Centres fully equipped to carry out fruit fly surveillance and research.

Output 4.2	**July - December 2000**
Continued.	• Refurbishment and security upgrading of facility in Laloki finalized. • All three Centres operational and well equipped, though acute power supply problems affect the program in Kerevat.

Output 4.3	**May 1997-September 1998**
Reduced losses caused by fruit flies by adoption of a whole system approach for the control of fruit flies, including protein bait spraying, bagging of fruits and cultural and biological control methods.	• Assessments of damage levels to fruits and vegetables done at LAES area. 2112 fruits, representing 10 commercial fruit species have been collected. • Levels of damage to guava (78%), cashew apples (66%), pumpkin (50%), yellow mangosteen (18%) and carambola (13%) assessed. • Field demonstrations on bagging of fruit and protein bait spraying commenced at prison at Kerevat on guavas. Initial results look very promising.

Output 4.3	**October 1998-April 1999**
Continued.	• Initial demonstration of bagging of fruits and protein bait spraying at the prison (Correctional Institution Service) at Kerevat was abandoned due to security problems there. A new demonstration has been established at the prison and it is proposed to use this demonstration as the basis for a video on fruit flies and their control as well as working with prisoners. UNDP and the RMFFP will co-operate on this activity. • Plots of carambola in the Laloki area and guava in the Bubia area have been identified for further demonstration/experimental work on protein bait spraying and bagging. Fruit sampling in both areas have given base-line levels of damage by fruit flies, mainly B. frauenfeldi. The RMFFP supplied Mauri Pinnacle Protein Insect Lure from Australia for the demonstrations. • A pest advisory leaflet on bagging of fruits has been drafted in English and Pidgin by UNV and the Junior Scientific Officer at Kerevat.

Output 4.3	**May-October 1999**
Continued.	• Protein bait spray demonstration trials carried out at the Kerevat Prison on guava, in the Markham Valley on guava and mango and at Laloki on carambola. Control in carambola resulted in reductions of damage from 100% to less than 10%. Results in the trials at Kerevat and Markham Valley were less spectacular, but still showed marked reductions in damage levels. Heavy rainfall hampered achieving acceptable control. The new formulation of protein bait spray will overcome this problem. • Bagging techniques were tested at the Kerevat Prison and in the Markham Valley. At the Prison, only 2 out of the 152 bagged fruits were infested with fruit flies. In the Markham Valley, the level of damage of bagged guava was 8.4% compared to that of unbagged fruits of 71% damage. • Combination of protein bait spraying and bagging of guavas at the Kerevat Prison allows the sale of guavas for 40-50 Toeas per fruit – a good income for the Prison. • Regular demonstrations of bagging and protein bait spraying to schools, farm visits and open days held at the research stations. Prison inmates and officers trained in the technologies.

Output 4.3	**November 1999 – June 2000**
Continued.	• Damage assessments ongoing. Market surveys for fruit damage on 10-12 selected host species done regularly in East New Britain and Morobe. Assessment in Laloki: bananas: up to 51% (*B. musae*), Malaysian carambola: 98-100% (*B. frauenfeldi*), local carambola: 36% (*B. frauenfeldi* and *B. papayae*), cucumber: 50% (*B. cucurbitae*), guava: 49% (*B. frauenfeldi, B. trivialis*), Honey Dew: 26% (*B. cucurbitae*), pumpkin: 57% (*B. cucurbitae*), papaya: 1% (*B. frauenfeldi*), watermelon: 31% (*B. cucurbitae*). Assessments in Morobe shows: 48% infested guavas and 25% ripe papayas infested, mostly by *B. frauenfeldi*. Important infestations of commercially grown Birdseye chilli by *B. bryoniae* in Morobe. • Bagging trial in carried out in Central Province to compare newspaper and plastic bags. • Bagging adopted by inmates at CIS Kerevat to produce and commercialize guavas. • Demonstrations of fruit bagging to school children and farmers. • Second trial at CIS Kerevat in late 1999-early 2000 to test protein bait spraying to control *B. frauenfeldi* and *B. obliqua* on Vietnam white guava. • Demonstration of protein bait spraying to chilli growers to control *B. bryoniae* in Morobe. • Leaflet in Tok Pisin on banana fruit fly produced and distributed to farmers in East New Britain. Farmers encouraged to bag bananas for prevention of banana fly infestations. • One issue of INFOFLY-PNG Newsletter on protein bait spraying produced and distributed in PNG. • Pest Risk assessment studies done in most provinces as a component of the ACIAR parallel project, based at Griffith University, Brisbane. Questionnaires on fruit transport in luggage distributed to in-flight passengers travelling, on ships, and to returning students. Results are presently being analyzed at Laloki Station and Griffith University. 1915 copies of questionnaire filled out by passengers on Air Niuguini flights in February and March. • Preliminary discussions engaged with SP Brewery about modification of waste yeast into protein bait.

Output 4.3	**July - December 2000**
Continued.	• Economic impact of fruit flies on commercial/edible crops well documented at each Centre by damage assessments. These will be quoted in the Pest Advisory leaflet. • Bagging trial on carambola in Kerevat. • Preparations in progress for establishment of bait spraying trial on cucurbits in Kerevat. • Protein bait spraying trial on cucurbits initiated in Laloki. • Plans underway to introduce Fipronil Gel in protein bait spraying. • Publication of special INFOFLY-PNG newsletter issue on banana fly and banana bagging for distribution to farmers.

Output 4.4	**May 1997-September 1998**
Improved technical capacity to develop data on heat tolerances of economically important species of fruit flies and to undertake host status testing of particular commodities not regarded as hosts to fruit flies.	• Laboratory colonies of *B. decipiens* and *B. frauenfeldi* established at LAES. • No other activities at this stage.

Output 4.4	**October 1998-April 1999**
Continued.	• Equipment and supplies for undertaking heat tolerance research on immature stages of fruit flies ordered from Biolab Supplies in New Zealand – should arrive in Fiji for transshipment by mid-April, 1999. • Colonies of *B. frauenfeldi* and later *B. papayae* set up at Bubia.

Output 4.4	**May-October 1999**
Continued.	• Colonies of *B. frauenfeldi* at Kerevat, *B. cucurbitae and B. papayae* at Bubia, and *B. musae* and *B. cucurbitae* at Laloki established in the laboratories. • Equipment to undertake heat tolerance studies supplied to each laboratory after the Workshop held in Vanuatu. • Three Junior Scientific Officers from PNG attended the Workshop on Generation of Heat tolerance Data for Immature Stages of Fruit Flies in Vanuatu in October-November 1999.

Output 4.4	**November 1999 – June 2000**
Continued.	• Stable laboratory colonies of *B. papayae* in Bubia and *B. frauenfeldi* in Kerevat, and small colony of *B. cucurbitae* in Bubia. • Reports of training workshop on Heat Tolerance Research (Port Vila, November 1999) produced by PNG staff and research proposals compiled in Laloki and Kerevat. Target species for Heat Tolerance Testing are *B. frauenfeldi* in Kerevat, *B. papayae* in Bubia, *B. musae* in Kerevat. Colonies in Bubia and Kerevat ready for HTT. • Colonies of *B. musae* in Laloki re-established after being destroyed in a break-in and vandalism of the facility. RMFFP provided funds to up-grade security of facilities.

Output 4.4	**July - December 2000**
Continued.	• Stable colonies of *B. frauenfeldi* in Kerevat. Power supply problems make HTT research a technically difficult task. Plans underway to establish a small banana fly colony. • Strong colonies of *B. papayae* in Bubia, although all flies are descendent from a few flies bred from one fruit. Urgent need to increase genetic variability. • Plans to reestablish banana fly colonies in Laloki. Generation of heat tolerance data on banana fly regarded as a priority in Laloki.

Output 4.5	**May 1997-September 1998**
National staff trained in fruit fly identifications and pre and post-harvest control strategies.	• Two of three National Junior Scientific Officers (JSOs) appointed and trained at Kerevat by UNV. • Two national staff attended training on fruit fly identifications and quarantine surveillance in Brisbane in June, 1997. • Contact with staff of National Agricultural Quarantine and Inspection Agency (NAQIA) and provincial Departments of Primary Industries and training on trapping provided to staff in island areas of PNG by UNV and JSOs.

Output 4.5	**October 1998-April 1999**
Continued.	• One Plant Protection Officer trained in emergency response planning and eradication procedures for four weeks with the Nauru Fruit Fly Eradication Programme in October-November, 1998.

Output 4.5	**May-October 1999**
Continued.	• Three Junior Scientific Officers to attend the hands-on training on eradication techniques and other aspects of fruit fly management in Nauru in November-December 1999. • 21 staff attended a training workshop on fruit fly biology, monitoring, control and identifications at UNITECH Rainforest Habitat in Lae in August 1999, run by ACIAR.

Output 4.5	**November 1999 – June 2000**
Continued.	• Assessment trip by Entomologist (Fruit Flies) to PNG (February) and Griffith University, Brisbane (March). • Consultancy by Allan Allwood to assess the impact of Junior Scientific Officer system in May. All three JSOs met with him and developed a work plan for 2000-2001. JSOs and senior entomologist capable and confident to operate of the PNG Fruit Fly Project themselves, with minimum external advisory input. • Technical reports summarizing achievements in Laloki and Bubia compiled by JSOs. • The three JSOs received practical training on fruit fly eradication in Nauru in December 1999 (see output 2.5. • The three JSO wrote and presented a paper of fruit fly project in PNG to the "PNG Food and Nutrition 2000 Conference" (26-30 June) at PNG University of Technology.

Output 4.5	**July - December 2000**
Continued.	• Junior Scientific Officers promoted to formal NARI contract positions with salaries still funded by RMFFP. • National staff (one coordinator, three Junior Scientific Officers, four technicians and four casual labourers) running the PNG Fruit Fly Project with advisory input by RMFFP or ACIAR. • High quality technical and survey reports produced by National staff. • Assessment trip by RMFFP Coordinator in December and ACIAR Entomologist (Dr. Tony Clarke) in September.

Immediate Objective 5:	**To ensure sustainable technical capacity for coordination of future activities on fruit flies in the Region.**

Output 5.1	**May 1997-September 1998**
A scientific officer within the Pacific Community trained in all aspects of fruit fly taxonomy, biology, ecology, control and quarantine treatments	• Entomologist (Fruit Flies) commenced duties in April, 1998. • Coordination of quarantine surveillance in new countries to the project – see Output 2.1.

Output 5.1	**October 1998-April 1999**
Continued	• Entomologist (Fruit Flies) resigned as of 13 April. Recruitment action commenced to replace for two years. • Assistant Entomologist (Fruit Flies) being recruited under funding from New Zealand Overseas Development Agency – to be trained for 2 years before taking over the coordination of fruit fly activities in the Pacific – see Output 5.2.

Output 5.1	**May-October 1999**
Continued	• Entomologist (Fruit Flies) (funding from Project) and Assistant Entomologist (Fruit Flies) (funding from New Zealand Government) recruited and commenced duties in September and October, respectively. UNV Entomologist in PNG moved to Entomologist (Fruit Fly) position. Assistant Entomologist position filled by national staff member for Fiji. • Action to identify replacement UNV Entomologist in PNG underway.

Output 5.1	**November 1999 – June 2000**
Continued	• End of CTA contract on 30 April, and Entomologist (Fruit Flies) takes over Project Coordination of RMFFP until 31 December 2000. Assistant Entomologist will take over in January 2001.

Output 5.1	**July - December 2000**
Continued	• Entomologist (Fruit Flies) will hand over coordinator position to Assistant Entomologist in early 2001.

Output 5.2	**May 1997-April 1999**
Core funding for scientific officer position from SPC at the completion of the project.	• No activities necessary until mid-1999. • Funding for a national trainee under SPC obtained from New Zealand – trainee to be appointed in July, 1999.

Output 5.2	**May-October 1999**
Continued	• Commenced development of proposal for extension of project to 2003 under the umbrella of the SPC Plant Protection Service, with joint funding from AusAID and UNDP, with parallel funding from the New Zealand Government.

Output 5.2	**November 1999 – June 2000**
Continued	• Extension of project to 2003 under the 'Pest Management in the Pacific' umbrella project has been approved, with funding from UNDP, AusAID and New Zealand Government.

Output 5.2 Continued	**July - December 2000** • Fruit fly activities fully integrated into "Pest Management in the Pacific" Project as "Component 2: Fruit Fly Management" by January 2001, officially ending the RMFFP Project. • Positions for project component coordinator and entomologist will remain externally funded.

Output 5.3 Two post-graduate scholarships for national staff, awarded on the basis of contribution to the achievements of the project.	**May 1997-April 1999** • No activities planned until 1999. **November 1999 – December 2000** • No post-graduate scholarships accorded.

Immediate Objective 6:	**To promote private sector involvement in sustaining quarantine surveillance and research into fruit fly control and quarantine treatments for commodities destined for export.**

Output 6.1 In countries that are exporting fresh commodities, a scheme of industry levies to support financially surveillance and research and development in field control and quarantine treatment development.	**May 1997-September 1998** • Supported the formation of a Fruit and Vegetable Council in Fiji through which levies may be administered. • Discussed the prospects of imposing levies at export in Fiji and Tonga – generally, there is support. **October 1998-April 1999** • Support, in principle, for levy of 1¢ per kg of produce exported from Natures Way Co-operative (Fiji) Ltd for research. **May-October 1999** • No additional action. **November 1999 – December 2000** • In kind support for fruit fly research from Natures Way Cooperative (Fiji) Ltd. This support involves provision of test fruit for confirmatory tests, of HTFA facility and staff to assist in the tests.

Output 6.2 Private sector advisory groups to determine how funds derived from levies should be spent to benefit research for farmers and exporters at all levels.	**May 1997-October 1999** • No activities, other than those of Output 6.1 **November 1999 – December 2000** • Quarterly meetings of the Heads of Research, Extension, Quarantine in MAFFA, Fiji Islands to discuss the priorities of fruit fly research. A cabinet paper prepared on Market Access Process – Fruit Fly Activities includes the formation of a Research Advisory Committee.