

REPORT OF MID-TERM REVIEW

OF

REGIONAL MANAGEMENT OF FRUIT FLIES IN THE

PACIFIC

PROJECT RAS/97/331

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I. EXECUTIVE SUMMARY

Tephritid fruit flies are major pests of fruits and vegetables in the countries and territories of the Pacific as elsewhere in the world. Not only can they severely limit the availability of a major food source for the peoples of individual countries, but also they create a serious quarantine impediment to the export of fruits and vegetables. While many countries have endemic species of fruit flies, a further problem has arisen in recent times, namely, the invasion of exotic species.

A regional approach to the problem of fruit flies in the Pacific region was initiated in 1990 and has been funded over the years by a variety of donors. The most recent project, the Regional Management of Fruit Flies in the Pacific - RAS/97/331 (RMFFP), commenced in May 1997 and will terminate in April 2000. This project, as with earlier projects in Solomon Islands, Federated States of Micronesia, Vanuatu and Tonga, has operated in parallel with a project funded by the Australian Centre for International Agricultural Research (ACIAR). This arrangement of linked projects, each complementing the other, has been a synergistic one and has yielded very substantial benefits to the Pacific Island Countries and Territories (PICTs).

The primary funding agencies, the United Nations Development Program, the Australian Agency for International Development and the New Zealand Overseas Development Agency required a mid-term review of the RMFFP. This review, which was to evaluate the progress towards the objectives of the project using success criteria listed in the project document, took place in October 1998, and this report contains the findings of the review.

Mid-way through the project, the RMFFP has either achieved, or has made substantial progress towards, all of the project's objectives - both development and immediate objectives. There is no reason why all its objectives will not have been fully achieved by the end of the project.

- * In collaboration with ACIAR, comprehensive information has been assembled on the fruit fly faunas of all PICTs together with associated biological and ecological information. The value of protein bait sprays for area control has been demonstrated and a commercial local source of autolysed protein has been established (in collaboration with ACIAR). The use of high temperature forced air units for post harvest disinfestation of fruits and vegetables destined for export has been established in four countries and there is commercial interest in this approach to exports in other countries.
- * Quarantine surveillance systems are in place and emergency response plans to deal with incursions of exotic species are being developed. A program to eradicate four serious exotic fruit flies in Nauru has commenced and this will have a significant training value in addition, hopefully, to a successful eradication outcome.
- * The implementation of effective fruit fly control techniques (bait spraying, crop hygiene, bagging) will increase the production of quality fruits and vegetables and so will contribute to export marketing and food security.
- * Progress towards the project's goals in Papua New Guinea (PNG) has been somewhat slowed because of a delay in the initiation of a complementary ACIAR funded project. Nevertheless, substantial activity has occurred, and once the ACIAR project is activated there is no reason to doubt that the RMFFP project's objectives

in this area will be achieved. It should be recognised that PNG presents special problems but its role as a potential source of fruit fly species exotic to the other countries in the Pacific is significant.

- * The sustainability of high level fruit fly research after the project's end is an important issue. While by April 2000 all PICTs will have well trained staff, sustainability of the project's objectives will depend on the continued availability of trained national staff, the continued commitment of the Governments and Administrations of individual PICT's, and the role of the Secretariat of the Pacific Community in sustaining and coordinating a regional approach. Unless there is a regional approach, particularly with respect to quarantine issues, a breakdown in the defensive quarantine wall which has been established would put all PICTs at risk.
- * Documentation of trapping, quarantine surveillance, host fruit survey, rearing etc procedures in each country/territory by the end of the project would lessen problems which will inevitably arise with employment of new staff.
- * Private sector involvement in quarantine and general research through financial support probably will be dependent on the establishment of a significant export market in fruits and vegetables.
- * The regional approach to the problem posed by fruit flies in the Pacific has been very successful. Comments by donors and national representatives at the Review meeting were all supportive although there was concern by some national representatives as to the sustainability of activities after April 2000. This issue has been addressed above.
- * The project was well designed and has been effectively implemented by all involved i.e., FAO, SPC and project staff.

II. RECOMMEDATIONS

1. That the RMFFP and SPC actively encourage all PICTs to continue to support fully their activities in quarantine surveillance and fruit fly research and the regional approach to the control of fruit flies in the Pacific region.
2. That each national Government or Administration, in collaboration with the RMFFP and SPC, prepare Emergency Response Plans, Fruit Fly Procedures Manuals, and Fruit Fly Status Reports prior to the termination of the RMFFP project.
3. That, to ensure ready availability of protein autolysate for fruit fly control within the Region, the RMFFP approach the private sector to establish additional commercial beer yeast waste conversion facilities.
4. That, to ensure current and potential importing countries have confidence in the quarantine procedures implemented by each PICT, these be audited from time to time by an appropriate organisation, e.g., New Zealand Ministry of Agriculture and Forestry - Regulatory Authority, Australian Quarantine and Inspection Service (AQIS), or Quarantine Authorities from the PICTs .
5. That, in order to enhance food security and national wealth further, the RMFFP and SPC, in liaison with the Forum Secretariat where appropriate, continue to encourage PICTs to seek export opportunities for their horticultural produce.
6. That each PICT be encouraged by the RMFFP to develop cost benefit data applicable to fruit fly control for presentation to the Terminal Review of the current project.
7. That the RMFFP and SPC continue to support Government and non-government extension activities to make commercial and village/subsistence sectors aware of the benefits of, and approaches to, fruit fly control.
8. That the RMFFP project, and when it ceases SPC, fosters the process of utilising expertise now available within individual PICTs to assist with problems arising elsewhere within the PICT community.
9. That all workers within the RMFFP project and the national Governments continue to publish the results of their research in reputable journals.
10. That the RMFFP, in association with ACIAR funded projects, consolidate the data relating to all aspects of the fruit fly projects which currently exist in several computerised data bases in one 'user friendly' database in a Pacific location (e.g., SPC), and protocols governing access to the data base be developed and agreed to by all parties, namely SPC, ACIAR, Griffith University, Queensland Department of Primary Industries and the national Governments and Administrations.
11. That, as a consequence of the breakdown of the PEACESAT communication facility, SPC investigate alternative means for the communication of fruit fly news, research and activities between the fruit fly workers of the Pacific countries and territories as a high priority.

12. That in mid-2001, there be a comprehensive review to determine whether, in the absence of the RMFFP, individual countries have been able to sustain the necessary level of activity in fruit fly research and development and to determine what, if any, additional support may be necessary.

13. That SPC explore the possibility of some additional financial support for the PNG program and perhaps programs in other PICTs after April 2000, e.g., Solomon Islands activities and the Palau eradication campaign for Oriental fruit fly, with appropriate organisations, e.g., AusAID, New Zealand Overseas Development Agency, ACIAR, the Australian Quarantine and Inspection Service.

III. INTRODUCTION

The Project on Regional Management of Fruit Flies in the Pacific - RAS/97/331 (RMFFP) is charged with the task of implementing a program of activities on fruit fly management that covers 22 Pacific Island countries and territories (PICTs). The activities include establishing and monitoring quarantine surveillance and improving emergency response preparedness in all PICTs, developing and demonstrating appropriate approaches to the field control of fruit flies, expanding the use of quarantine treatments for fresh fruits and vegetables based on non-host status and high temperature forced air treatment, increasing public awareness of the risk of exotic fruit flies entering countries, and transferring technology between the PICTs. The RMFFP has adopted a regional approach to the management of fruit flies.

The RMFFP is funded on a cost-sharing basis by the United Nations Development Programme (UNDP) and the Australian Agency for International Development (AusAID), with supplementary funding from New Zealand Overseas Development Agency (NZODA).

The current project builds on previous regionally based projects (RAS/90/004, RAS/93/300) and FAO Technical Cooperation Projects (TCP/RAS/0055, TCP/RAS/2360) which commenced in September 1990. For much of that time there have been complementary projects supported by the Australian Centre for International Agricultural Research (ACIAR) (8920, CS2/94/03, 7500). The close integration of these projects has been one of the major strengths of the overall program.

Species of tephritid fruit flies are major pests of fruits and vegetables throughout much of Africa, Asia, Australia, the Americas and the Pacific Islands. In many cases, pest species are endemic to particular geographical areas. However, in recent times due often to increasing global commerce and tourism, introductions of exotic species have added a new dimension to the fruit fly problem and have caused significant economic losses to invaded countries (the project document gave examples of the spread of exotic fruit fly species which pose a threat to the countries of the Pacific area). Combating this problem requires detailed knowledge of fruit fly ecology, behaviour and control, and effective surveillance systems both to monitor endemic fruit fly activity and to detect incursions of exotic species.

Some 18 months into the RMFFP project the major donors required that there be mid-term review the scope of which was defined as follows.

The scope of the Mid-Term Review was primarily to assess the progress of project activities against the Development and Immediate Objectives contained in the Project Document for RAS/97/331 : Project on Regional Management of Fruit Flies in the Pacific. It was also to determine whether outputs and outcomes meet the intended objectives of the Project and donor agencies, and whether these have been achieved within acceptable time frames. Based on the achievements to date, an assessment of whether the Project will reach all of its targets by 30 April 2000 was also required.

The RMFFP has operated in parallel with a project on fruit flies in Vanuatu, Solomon Islands and Federated States of Micronesia (FSM) funded by ACIAR. The ACIAR Project (CS2/94/03) operated from January 1997 and will cease on 31 December 1998. As well as operating in tandem with RMFFP in quarantine surveillance for fruit flies and some elements of field control, the ACIAR Project provided valuable expertise that was not

The Chief Technical Advisor of the RMFFP (Mr Allan Allwood), the Project Leader of the ACIAR project (Professor Richard Drew) and representatives of the Secretariat of the Pacific Community (SPC) (Dr Mick Lloyd) and ACIAR (Dr Paul Ferrar) agreed that it would be mutually beneficial to hold a joint review of the two projects. There were sufficient complementary areas in the two projects to warrant this approach. The Mid-Term Review of the RMFFP was to be done by Dr Gordon Hooper.

The ACIAR Project required a Terminal Review and normally two reviewers are used. In this instance Dr Jim McWilliam together with Dr Hooper were to review the ACIAR Project.

Dr McWilliam was to be responsible for compiling the ACIAR Review Report and Dr Hooper was to compile and present the RMFFP Review Report. Both reviewers were to provide technical and managerial inputs into each of the reviews.

IV. TERMS OF REFERENCE

The review of the RMFFP will be conducted under the following Terms of Reference. The Reviewer shall:

1. assess the achievements of the RMFFP in the Pacific Island Countries and Territories (PICTs) and comment on these in relation to the development and immediate objectives and success criteria contained in the project document;
2. identify national and regional constraints to attaining these objectives;
3. determine the degree to which the regional approach to the management of fruit flies has been successful and comment on the appropriateness of this approach to the PICTs nationally and to the region as a whole;
4. where possible, comment on the prospects for sustainability of the technologies originating from the project and the regional approach;
5. identify the benefits that may accrue from results being adopted by farmers to poverty alleviation, food security, rural employment and improvements to human nutrition;
6. comment on the effectiveness of the modality of the project, i.e. project design, project execution by SPC, project implementation by FAO and linkages with related projects and international institutions;
7. provide an assessment of the timeliness of delivery of services, particularly through funding national and regional activities; and
8. compile and present a draft report by 11 November and a final report by 18 November.

V. ASSESSMENT OF PROJECT WITH RESPECT TO THE TERMS OF REFERENCE

This assessment is based on presentations given at the Joint Review Meeting held at Nadi, Fiji on 6-7 October 1998 (the Agenda for this meeting is given in Appendix 1), documentation provided by the Chief Technical Advisor, other material listed in Appendix 2, and visits to Tonga, Vanuatu and Kerevat, Papua New Guinea (people met on country visits and the reviewer's itinerary are given in Appendices 3 and 4 respectively). Representatives from 10 PICTs, UNDP, FAO, ACIAR, SPC, New Zealand and RMFFP staff attended the meeting. It was unfortunate that there was no representative from one of the major donors, AusAID.

The progress towards each Immediate Objective is assessed against the Success Criteria for each objective given in the Project Document. Inevitably, given the close integration of the RMFFP project and ACIAR projects CS2/94/03 and 7500), documentation provided by ACIAR with respect to their projects was also relevant.

TERM OF REFERENCE 1

Assess the achievements of the RMFFP in the Pacific Island Countries and Territories (PICTs) and comment on these in relation to the development and immediate objectives and success criteria contained in the project document

Development Objective

This was given as stated in the Project Document as:

To strengthen the technical capacity of the Governments and Administrations and the private sectors in PICTs to manage fruit flies regionally in order to protect fresh fruit and vegetable production and export and to enhance farmers' incomes, food security and rural employment.

The degree to which the Development Objective has been met halfway through the life of the project is determined by the degree to which the six Immediate Objectives have been met. An assessment of the Immediate Objectives, which is given below, leads to the conclusion that the Development Objective has been met to a substantial degree and that there is reason to be confident that, by the end of the project in April 2000, the Development Objective will have been achieved.

The degree to which the technical capacity of individual PICTs has been strengthened, must be expected to vary. For example, it should be accepted that the technical capacity of countries which were early participants in the program, say Fiji and Tonga, will be stronger than later participants, say Nauru and PNG. Similarly the degree to which the private sector has been strengthened will be determined, at least in part, by the sophistication of the agricultural industries and the opportunity for growth of exports.

Immediate Objective 1

To overcome constraints on production and export of fresh fruits and vegetables in FSM, Solomon Islands and Vanuatu caused by the presence of damaging fruit fly species

The fruit fly fauna and extensive host records have been established for FSM (which appears to have only one economically important species), Vanuatu and Solomon Islands. Much of these data was obtained under the complementary ACIAR Project CS2/94/03. Current national staff have received training in fruit fly identification and control techniques.

Quarantine surveillance trapping systems have been established and are being maintained.

Laboratory colonies of important local fruit fly species have been established in the three countries.

To date there has been preliminary work on field control of fruit flies, but pilot demonstrations of protein spraying and bagging will be carried out as part on a recently commissioned consultancy.

Tephritid parasitoids have been introduced into Solomon Islands and FSM and there are indications that they have established themselves. It will be interesting to see whether they will have any significant impact on tephritid populations and/or vegetable/fruit damage levels.

Host testing of 'Queen' pineapple, Lisbon lemon and Mexican lime to facilitate exports has been carried out with *B. frauenfeldi* in Solomon Islands and the experiments showed that these fruits are not hosts within the meaning of the New Zealand Ministry of Agriculture and Forestry - Regulatory Authority Standard 155.02.02. Similarly, host testing of 'Queen' pineapple, cucumber and squash in Vanuatu has shown non-host status under the same standard.

National staff have attended training workshops in fruit fly taxonomy, quarantine surveillance and control. Status Reports on Fruit Flies and Fruit Fly Manuals have been prepared in Vanuatu, Solomon Islands and FSM and are being extensively used by national plant protection and quarantine staff.

Immediate Objective 2

To improve substantially the quarantine preparedness of PICTs to cope with inevitable outbreaks of exotic fruit flies regionally.

Quarantine surveillance systems, which involve both male lure traps and fruit collections, have been established in 21 PICTs. Seven national systems are wholly maintained by Governments (New Caledonia, French Polynesia, Guam, CNMI, Fiji, Tonga, Cook Islands), four are partly maintained by RMFFP (Samoa, FSM, Vanuatu, Solomon Islands), and three fully by RMFFP (PNG, Niue, Nauru). The RMFFP has also provided quarantine surveillance kits to a further six PICTs (Tuvalu, Tokelau, Wallis and Futuna, Palau, Kiribati, Marshall Islands). Irregular trapping and limited host surveys have been conducted on Pitcairn Island.

While not mentioned as a 'Success Criterion', the establishment of reference collections of fruit flies, which was a responsibility of ACIAR Project CS2/94/03, is very relevant. These collections which contain authoritatively named specimens of the local fruit flies, and which will in the future also contain specimens of exotic species that could pose a threat, now exist in nine countries.

Emergency Response Plans (ERPs) for exotic pest tephritids in draft form have been prepared by nine PICTs, and it is the intention that staff of PICTs that are involved in the Nauru eradication exercise will complete ERPs whilst they are in Nauru.

The issue of accessibility of supplies required for eradication of an exotic tephritid species was raised during the Review Meeting. Some supplies are to be stored with SPC in Fiji and discussions are under way with New Zealand for access to further supplies/materials.

The Nauru eradication exercise commenced in October 1998 and will be a very useful training experience for national staff. It will also significantly enhance the knowledge and confidence of staff of PICTs, who could be involved in future eradication programs. Staff from 14 PICTs participated in a regional symposium on eradication of Oriental fruit fly in Tahiti and Moorea in November 1997.

An entomologist dedicated to fruit fly activities has been appointed to SPC with funding provided initially by RMFFP for three years. Also, the NZODA has approved funding for a scientist from a PICT to be appointed to SPC in July 1999, to be trained to coordinate fruit fly activities regionally in the long term. Core funding is to be identified for this position.

Considerable effort has been devoted to increasing public awareness of the importance of fruit flies. They were specifically mentioned as quarantine issues on several flights made by the reviewer within the region, and the production of Pest Advisory Leaflets is in hand with three produced so far and three in draft. Fruit fly manuals have been produced by Vanuatu and Solomon Islands and other countries should be encouraged to follow suit. One fruit and vegetable grower met on Vanuatu demonstrated a very good understanding of the threat posed by fruit flies particularly with respect to quarantine and export issues.

The PEACESAT facility has failed in a number of countries and as a consequence not all PICTs can now participate in the FLYNET sessions. This should be of considerable concern. If the fruit fly program is to continue to have the required regional focus, particularly after the current RMFFP project ceases in 2000, some channel for the informal exchange of information between staff of the widely dispersed countries of the South

Pacific community is essential. Voice communication is highly desirable but this will require some new satellite based system. Until that becomes possible some other means of communication, e.g., a newsletter, is an urgent requirement.

There are ongoing discussions with UNDP and the Australian Quarantine and Inspection Service on the development of a Webpage for fruit flies. This could be well be a useful initiative for some areas of the regional fruit fly program but it is not a satisfactory alternative to the informal exchange of information between the workers of the PICTs via a voice based realtime communication medium.

The data base containing the distribution of tephritid species, host records, and associated parasitoids has been maintained. The data base previously held by Queensland Department of Primary Industries has been released to seven PICTs and discussion on its future with Griffith University is in progress. The structure and location(s) of the data bases established over recent years, and access privileges needs serious consideration.

There has been a very significant increase in both the number, and the level of competence, of national staff to identify fruit fly species, to carry out faunal and quarantine surveillance surveys, to carry out field control, and to establish quarantine treatments. This has come about through active involvement of national staff in these activities and through a number of training courses conducted collaboratively by RMFFP and ACIAR project staff. The 'Fruit Fly Identification, Biology, and Surveillance: Solomons, Vanuatu, Papua New Guinea' manual produced for a training course in Brisbane in June 1997 deserves special mention as an outstanding contribution to the knowledge of tephritid fruit flies in that part of the Pacific region. A similar document for the whole region would be very valuable.

The appearance of ACIAR Proceedings No 76 - 'Management of Fruit Flies In the Pacific' which published papers presented at a Regional Symposium in Nadi in October 1996 is a major achievement of both the RMFFP and ACIAR projects. This document clearly demonstrates both the competence of workers in the PICTs, and the impact that the projects have had.

Immediate Objective 3

To enhance the 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 projects.

A consultancy was initiated in September 1998 with the aims of (i) establishing the value of fresh fruit and vegetable production at the village and subsistence level (test countries being Vanuatu, Solomon Islands, Fiji, Tuvalu, Samoa), (ii) determining the level of adoption of protein bait spraying (Solomon Islands, Vanuatu) and fruit bagging (Solomon Islands, Vanuatu, Fiji), and (iii) estimating the increase in fruit production from the use of bait spraying and fruit bagging. The data and conclusions developed by this consultancy will be of considerable interest and value.

One success criterion called for the production of manual on fruit flies in the Pacific by December 1997. However, it has been decided that the aim of this proposal would be better met by the production of manuals for individual countries together with a publication

listing the fruit fly species in the Pacific, with pictorial keys, and including information of control and eradication procedures.

The transfer of control technology, field and laboratory experimental data, and the results of quarantine surveillance activities between PICTs will require dedicated staff, and as discussed above, some user-friendly means of communication. The transfer of information within individual PICTs, e.g., from fruit fly workers to fruit and vegetable growers at the commercial, village and subsistence levels will be easier but will involve effective extension programs. This will require the production of appropriate information, e.g., Pest Advisory Leaflets and posters, and its dissemination in an appropriate form, and field demonstration plots and field days. Good progress has been made in these areas but further efforts will be needed.

Data have been obtained which clearly demonstrate that the use of protein bait spraying will reduce loss of fruit/vegetable production, e.g., losses reduced (i) from around 97 to <10% in capsicums in Tonga, (ii) from 18-42 to 2-6% in guava in Fiji, and (iii) losses in mango and pawpaw in Cook Islands were reduced to about 1%. Trial work to evaluate the combined effect of fallen fruit destruction and protein bait spraying at a village level is being conducted for Niue at present.

More work is needed to evaluate the combined potential of the destruction of fallen fruit and bagging to reduce fruit/vegetable losses in village and subsistence environments. Pilot studies and demonstrations included in the consultancy initiated in September 1998 will assist in generating data on combined techniques.

Determination of the tephritid fauna in the PICTs and the establishment of the quarantine trap surveillance network has increased the confidence of PICTs and their trading partners on quarantine issues. Emergency response plans will be prepared by staff of all PICTs during their involvement with the Nauru eradication exercise and this will enhance the ability of PICTs to respond to outbreaks of exotic fruit flies.

ACIAR Project 7500 and the USDA Commercial Agricultural Development Project supported the development of pilot protein autolysate production from brewery yeast waste at the Royal Beer Company, Tonga and, together with RMFFP and Tongan staff, demonstrated that a commercially viable protein product for bait spraying could be produced. This product, 'Royal Tongalure', is now available and current production is about 100 litres of product per week. This production utilises only part of the brewery yeast waste and production is constrained by the scale of the available equipment. This protein product is much cheaper than the hitherto available product from Australia. Consideration should be given to stating the protein, or solids, concentration of each batch, or at least a given minimum concentration, on the 'Royal Tongalure' label to enhance user confidence in the product.

Growers in Fiji are seeking to import and use 'Tongalure'. Further protein production facilities are required and the Fiji Bitter Brewery and Vanuatu Brewery Limited are interested in establishing such facilities.

Heat tolerance data for eight species have been completed by the RMFFP, New Zealand Horticulture and Research and Governments (*B. passiflorae*, *B. xanthodes*, *B. kirki*, *B. facialis*, *B. melanotus*, *B. curvipennis*, *B. psidii* and *B. tryoni*). The generation of heat tolerance data for two other species in two countries have been commenced (*B. trilineola* in Vanuatu and *B. frauenfeldi* in Solomon Islands).

The development of a regional data base on the heat tolerance of different species with the objective of supporting the concept of generic heat treatment is being discussed with UDSA-ARS, Hawaii.

Host status data are being collected in eight PICTs. The ability to successfully rear significant numbers of particular tephritid species is a pre-requisite for heat tolerance work and, while rearing is well established in some nine PICTs, in other countries either appropriate environments for rearing are not yet available, e.g., Kerevat in PNG (where, however, *Bactrocera frauenfeldi* is being reared on a small scale), or difficulty is being encountered with particular species, e.g., *B. kirki* in Tonga.

The use of High Temperature Forced Air (HTFA) units to ensure that export fruit and vegetable fruits satisfy the quarantine requirements of importing countries have been established in four countries (Cook Islands, Fiji, Tonga, New Caledonia). The unit in Fiji is commercially owned and operated and has exported eggplant, mangoes and papayas. The unit in Tonga has increased the export of papayas and recently had a good reception to the export of tomatoes. The acting Director of Agriculture and Forestry in Tonga was delighted with this progress and full of praise for the RMFFP program. The unit in Cook Islands has allowed the export of papayas and recently mangoes. A fruit and vegetable producer in Vanuatu was very interested in this approach and was involved with other producers in defining the size and location of unit needed for commercial operation.

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.

Laboratories at the Lowlands Agricultural Experiment Station (LAES), Kerevat, Rabaul, and at Bubia, Lae have been established, while modifications to the facility at Laloki, Port Moresby should be completed by the end of the year.

In the project document, adoption of the bait spray technology by farmers was anticipated by December 1998. This deadline will not be met. A field trial was initiated in August 1998, but had to be abandoned due to external circumstances. Further work is planned.

Work to promote bagging as control measure in the village situation has commenced with an extensive publicity campaign.

A colony of *B. frauenfeldi* is being maintained at Kerevat but the room conditions are too hot for efficient rearing. Discussion is underway with LAES officials about the availability of additional space which, however, will require modification and the provision of air-conditioning. Until better rearing conditions are available little, if any, progress towards the gathering of heat tolerance data can be expected. In any event the equipment required for this work is not available.

Similarly, work on the development of fruit flies on artificial diets has not commenced and cannot be expected to commence until the rearing environment problem, referred to in the previous paragraph, is addressed.

The PNG program at the three centres was initiated by the UN Volunteer, Mr Luc Leblanc. He trained two Junior Scientific Officers - Ms Amanda Mararvai, now stationed at Kerevat, and Mr Solomon Balagawi, now stationed at Bubia. Both these officers, provided under the RMFFP, have received training in the identification of tephritids, control and quarantine surveillance. A third Junior Scientific Officer is to be appointed and stationed at Laloki.

The soon to be implemented ACIAR project will provide for a technician at the each of the three centres which will enable work to be accelerated.

Quarantine surveillance trapping has been established on the main island of PNG as well as a number of the offshore islands. This programme has yielded a large number of specimens and the establishment of reference collections. Professor Drew has advised that once the ACIAR project commences identification of the backlog of collected flies should be completed in about six months. A considerable amount of host fruit collection and rearing has been carried out in the Rabaul and Laloki areas.

A newsletter, 'Infofly PNG', has been initiated and will serve a useful purpose. Other extension activities include the translation of the mango fruit fly advisory leaflet into pidgin, and production of an audiotape describing, in pidgin, the problem posed by fruit flies and their control for broadcast on radio.

Despite the slow progress towards this Immediate Objective, given the delayed start of the new ACIAR project and the time taken to recruit and train national staff, the progress made has been significant. Currently at LAES, Kerevat six scientific staff involved with four different projects have to share one utility vehicle which causes difficulties for the fruit fly field program. This deficiency needs to be addressed by the RMFFP urgently.

Immediate Objective 5

To ensure sustainable technical capacity for coordination of future activities on fruit flies within the Region.

A fruit fly entomologist was appointed to SPC's Plant Protection Service in April this year and there is a commitment by SPC that this position will be supported for three years. Also, SPC has obtained funding from New Zealand for a PICT scientist to be trained for coordinating fruit fly activities. This is an important position because SPC will have a crucial role in sustaining a regional approach to the fruit fly problem in the Pacific when the current RMFFP project ceases in April 2000.

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.

The RMFFP supported the formation of a Fruit and Vegetable Council in Fiji and there has been some discussion on the matter of imposing levies on export produce to support research and development. Contact has also been established with industry groups in 11 other countries.

TERM OF REFERENCE 2

Identify national and regional constraints to attaining these objectives (i.e., those referred to in Term of Reference 1)

Potential constraints at the national level could include (i) lack of commitment to the program by Governments and/or senior Government officials, (ii) inadequate funding arising from preceding point, (iii) delays in seeking quarantine approval for exports, and (iv) delays in seeking out new export markets. There is no evidence that any of these possible constraints have occurred in the project to date.

At the regional level, there are currently no constraints because of the existence of the RMFFP project and regular meetings of its Steering Committee. As mentioned earlier, SPC will have a major role in maintaining a regional commitment to the objectives of the program after April 2000.

TERM OF REFERENCE 3

Determine the degree to which the regional approach to the management of fruit flies has been successful and comment on the appropriateness of this approach to the PICTs nationally and to the region as a whole

At the outset of this project it was recognised that it was neither possible nor practicable to provide the same level of inputs to all 22 PICTs. Rather the countries/territories were characterised into three groups; (i) those with established fruit fly programs (Solomon Islands, Vanuatu, FSM, Fiji, Tonga, Samoa, Cook Islands), (ii) those needing considerable input into fruit fly programs (Niue, Nauru, PNG), and (iii) those with partial fruit fly programs (American Samoa, Kiribati, Marshall Islands, Palau, Pitcairn, Tokelau, Tuvalu and Wallis and Futuna). This was a sensible approach given that the available resources were necessarily finite.

The regional approach, outlined in the Project (p 22) and implemented as outlined above, appears to have been very successful. One gains the impression that the individual countries/territories have accepted that a regional, i.e., mutually supportive, approach to the problem of fruit flies in the Pacific, is essential. All PICTs now have an acceptable and

sustainable level of expertise and quarantine preparedness. As discussed elsewhere, the maintenance of a quarantine surveillance system that has been established in the PICTs is essential to maintain the defence of the regions against incursions of exotic fruit fly species.

TERM OF REFERENCE 4

Where possible, comment on the prospects for sustainability of the technologies originating from the project and the regional approach

There is no reason why the technologies relating to fruit fly control and quarantine surveillance should not be sustainable in the long term as long as:

- (i) Governments, and senior departmental staff, of the PICTs continue to support the objectives of the fruit fly program, and ensure that appropriately trained staff are made available and supported,
- (ii) effective extension programs devoted to the importance of fruit fly surveillance and control programs are initiated and maintained, and
- (iii) active collaboration and transfer of information continues between the PICTs to sustain an effective regional approach is strongly encouraged.

SPC will need to play a vital role in ensuring long term sustainability.

TERM OF REFERENCE 5

Identify the benefits that may accrue from results being adopted by farmers to poverty alleviation, food security, rural employment and improvements to human nutrition

The Project Document (p 19) presented some data of the level of fruit and vegetable losses in a number of countries as a consequence of fruit fly attack. The control measures being developed and actively promoted by RMFFP, i.e., protein bait spraying, field hygiene, time of harvest and bagging should limit the losses caused by fruit flies and so increase the amount and quality of fruit and vegetables available for consumption, sale locally and export.

Within the village and subsistence environments, this should translate into improved human nutrition and enhanced food security. The current consultancy which aims to document the value of fruit and vegetable production at the subsistence level and the impact of increases in that production on poverty and rural employment will provide very useful data.

Within the commercial sector, particularly where exports are being considered, better field control of fruit flies coupled with HTFA treatment should increase both quantity and range of horticultural produce. This development could lead to increased employment and a general benefit to the country as a consequence of increased export derived income.

TERM OF REFERENCE 6

Comment on the effectiveness of the modality of the project i.e. project design, project execution by SPC, project implementation by FAO and linkages with related projects and international institutions

The RMFFP project was well designed and has been effectively implemented with almost all intermediate deadlines met. Project execution by SPC, implementation by FAO, together with the involvement of UNDP and other donors appears to have been harmonious and have contributed to the success of the RMFFP.

For this program, to date, and for previous programs, there have been simultaneous and complementary ACIAR programs. This joint approach to the fruit fly problem in the Pacific region has been extremely effective and productive, and the contribution of the two coordinators, Mr A. Allwood for the RMFFP projects and Professor R. Drew for the ACIAR projects, must be acknowledged.

Strong linkages with external organisations have been forged, e.g., with Griffith University, New Zealand Government authorities, Australian Government authorities, and the United States Department of Agriculture.

TERM OF REFERENCE 7

Provide an assessment of the timeliness of delivery of services, particularly through funding national and regional activities

All PICTs were provided with quarantine surveillance kits by 31 July 1998. Laboratories were set up at Kerevat and Bubia, PNG by September 1998. Funds have been provided for modifications of the laboratory at Laloki, PNG, which will be completed by the end of December 1998, and the eradication laboratory in Nauru by mid-October 1998.

Imprest accounts were maintained in Fiji, Cook Islands, Samoa, Tonga, Vanuatu, Solomon Islands, PNG, FSM, Nauru and Niue. New imprest accounts primarily for quarantine surveillance expenditures are being set up in Wallis and Futuna, Tuvalu, Tokelau, American Samoa, Palau, Kiribati and Marshall Islands.

Although expenditure has been below the predicted level for most of 1998, high expenditure related to the Nauru eradication program and increased activity in PNG will ensure that the budget is 80-85% committed by the end of the year.

TERM OF REFERENCE 8

Compile and present a draft report by 11 November and a final report by 18 November

A draft Executive Summary incorporating Recommendations was presented to a meeting of donors and project staff in Suva on 11 November 1998, and the final report was available in Suva on 18 November, 1998

VI. GENERAL OBSERVATIONS

At the mid-term point of the RMFFP, it is clear that very substantial progress has been made and, in many cases, the end of project success criteria have already been met. There is no reason to suppose that all will not be fully met by the end of the program. This project, together with the earlier ones and the associated ACIAR projects, has very significantly increased our knowledge of the composition of the tephritid fruit fly fauna in the Pacific region, quarantine surveillance systems have been established, approaches to control at both the commercial and village/subsistence levels have been devised, post-harvest disinfestation facilities have been established, and export possibilities for fruit and vegetables have been fostered. A regional acceptance of the importance of the problems posed by fruit flies and of the importance of quarantine has resulted.

In comments made by some countries at the conclusion of the Review Meeting, there was an indication of a degree of unease as to the sustainability of the objectives of the program once the RMFFP project ceases in April 2000. This suggests that SPC will have a very important role at that time.

There is a need for some means of regular, informal communication between the PICTs to ensure regional cohesion. PEACESTAT has met that demand but can no longer be relied upon.

It is inevitable that there will be staff changes in coming years. Detailed documentation of all activities of the fruit fly programs within each country would assist in ensuring that new staff become effective quickly and that essential programs are not compromised.

As a result of the RMFFP program, and associated ACIAR projects, there is now a substantial corps of well trained scientific personnel in the fruit fly area in the Pacific region. This is one of the major successes of the projects. These people must be fostered and supported. There now is expertise in all areas of fruit fly work somewhere within the Pacific community. These people should be viewed as a regional, not only a national, resource and utilised to assist in solving individual country problems if they arise.

Given the pressure that many countries now face from incursions of exotic fruit flies, the maintenance of the quarantine surveillance systems that have been implemented in the Pacific region is of critical importance. If the defensive quarantine barrier is breached at any point, the security of entire region could be compromised.

It should be accepted that some countries/territories may require assistance to meet the requirements of the regional concept after the RMFFP project ceases. This could be

determined by an assessment of the program in each of the PICTs say 9-12 months after the project ends.

United Nations Volunteers have played a very important role in the success of the RMFFP project.

JOINT REVIEW

**PROJECT ON REGIONAL MANAGEMENT OF FRUIT FLIES IN THE PACIFIC
(FAO,AusAID,UNDP, New Zealand Government, SPC – RAS/97/331
AND
PROJECT ON IDENTIFICATION OF FRUIT FLIES IN VANUATU, SOLOMON
ISLANDS AND FEDERATED STATES OF MICRONESIA (ACIAR CS2/94/03)
Tanoa Hotel, Nadi, Fiji : 6 – 7 October, 1998.**

AGENDA

Tuesday, 6 October, 1998

- | | | | |
|----|----------------------|--------------------------------------------|----------------|
| 1. | Welcome | (Dr. M.Lloyd (SPC) & Dr. P. Ferrar(ACIAR)) | 8.30-8.40am |
| 2. | Introductory Remarks | | |
| | (a) | Purpose, scope and format of reviews | |
| | | - RMFFP (Dr. G. Hooper) | |
| | | - ACIAR Project (Dr. J. McWilliam) | 8.40–8.50am |
| | (b) | History, background and objectives | |
| | | - RMFFP (A. Allwood) | 9.00 – 10.00am |
| | | - ACIAR Project (Prof. R. Drew) | 10.00–10.30am |

Morning Tea

10.30 am

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|----|---------------------------|------------------------------------------------------------------------------------------------------------------|---------------|
| 3. | Progress and Achievements | | |
| | (a) | Overview of fruit fly fauna and taxonomy | |
| | | - Solomon Islands | |
| | | - Vanuatu | |
| | | - FSM | |
| | | - PNG | |
| | | - Complexes in other Pacific Islands (Prof. R. Drew) | 11.00–11.30am |
| | (b) | <u>Objective 1</u> : Extension of fruit fly activities of Phase II in Solomon Islands, Vanuatu, FSM (with ACIAR) | |
| | | (A. Allwood, Dr. B. Stephenson, Luc Leblanc, Prof. R. Drew) | 11.30–12.30pm |

Lunch

12.30–1.30pm

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|--|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| | (b) | <u>Objective 2</u> : Improvement to quarantine surveillance and preparedness for eradication of exotic fruit flies regionally
(A. Allwood, Dr. B. Stephenson, Prof. R. Drew) | 1.30–2.30 pm |
| | (c) | <u>Objective 3</u> : Technology transfer and adoption to increase production and export of fruits regionally, including bait spray technology (with ACIAR)
(A. Allwood, Prof. R. Drew) | 2.30–3.30pm |

Afternoon Tea

3.30pm

- (d) **Objective 4:** Specific multi-disciplinary programme for fruit fly management in PNG (with ACIAR)
(A. Allwood, Luc Leblanc, Prof. R. Drew) 3.45–5.00pm

Wednesday, 7 October, 1998

Discussions and questions on previous day's activities 8.30–9.00 am

3. Progress and Achievements

- (f) **Objective 5:** Regional sustainability and coordination of fruit fly management activities (A. Allwood) 9.00–9.30 am

- (g) **Objective 6:** Private sector assistance in funding research and development into fruit flies (A. Allwood) 9.30–10.00am

Morning Tea 10.00am

- (h) Training (Prof. R. Drew, A. Allwood) 10.30–11.00am

- (i) Publications (A. Allwood, Prof. R. Drew) 11.00–11.30am

4. Appropriateness of project design, execution and Implementation methods (A. Allwood) 11.30–12.00pm

5. Global Plant and Pest Information System (GPPIS) (Dr. B. Stephenson, A. Allwood) 12.00–12.15pm

6. Pacific/South-East Asia Fruit Fly Advisory Group (A. Allwood) 12.15–12.30pm

Lunch 12.30–1.30pm

Discussions and Questions on morning activities 1.30–2.30pm

7. Financial Statement - RMFFP (A. Allwood) 3.00–3.30 pm

Afternoon Tea 3.30pm

8. Concluding Remarks
 - UNDP
 - AusAID
 - NZODA
 - FAO
 - SPC
 - ACIAR
 - Country Representatives 3.45–4.45pm

9. Closure of Review Meeting 5.00 pm

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Literature consulted during review

Report for Mid-Term Review of Project on Regional Management of Fruit Flies in the Pacific (RAS/97/331) 1998.

Project Document, Regional Management of Fruit Flies in the Pacific (RAS/97/331).

Report on Regional Fruit Fly Project (RAS/93/300).

Report of First Steering Committee Meeting on Project on Regional Management of Fruit Flies in the Pacific (RAS/97/331), 15-16 September 1997.

Report of Second Steering Committee Meeting on Project on Regional Management of Fruit Flies in the Pacific (RAS/97/331), 4 March 1998.

Report for Tripartite Review of Regional Project (RAS/93/300), 18 October 1996.

Report of Combined Evaluation of the Regional Fruit Fly Project (RAS/90/004) and the ACIAR Fruit Fly Project (Project 8920), July 1993.

Report on Strategy for Eradication of Oriental Fruit Fly in French Polynesia. 14 August 1996.

Manual for Training Course on Papaya Fruit Fly, Cairns, 27-31 May 1996.

Manual for Fruit Fly Identification, Biology and Surveillance: Solomons, Vanuatu, and Papua New Guinea, Brisbane, 23-27 June 1997.

Fruit Flies (Family Tephritidae) in the Solomon Islands, Extension and Quarantine Workers Handbook (undated).

Status of Fruit Flies (Family Tephritidae) and Fruit Fly research in the Solomon Islands, April 1998.

Fruit Fly Project Manual produced by fruit fly workers in Vanuatu.

Document produced by ACIAR for the Review of ACIAR Project CS2/94/03, October 1998.

Management of Fruit Flies in the Pacific. ACIAR Proceedings No. 76, 1998.

People met during country visits

FIJI (Nadi)

Mr Sant Kumar Manager, Nature's Way Cooperative (Fiji) Limited

TONGA (Nuku'alofa)

Mrs Eleanoa Amanaki Acting Director, Ministry of Agriculture and Forestry

Mr Viliami Kami Entomologist, Vaini Research Station, Ministry of Agriculture and Forestry

Mr Tu'ipulotu Langi Technician, Vaini Research Station, Ministry of Agriculture and Forestry

Mr Sione Foliaki Head, Quarantine Division, Ministry of Agriculture and Forestry

Mr Otenil Tu'ipuloto High Temperature Forced Air facility, Ministry of Agriculture and Forestry

VANUATU (Port Vila)

Mr Benuel Tarilongi Principal Plant Protection Officer, Department of Agriculture & Horticulture

Mr David Tau Plant Protection Officer, Department of Agriculture & Horticulture

Mr Eun Kanas Quarantine Officer, Department of Agriculture & Horticulture

Mr Richard Eade Fruit and vegetable grower

Mr Lennart Satmark Master Brewer, Vanuatu Brewing Limited

PAPUA NEW GUINEA (Rabaul)

Mr Geoff Wiles Research Program Leader, Lowlands Agricultural Research Station, Kerevat

Mr Verave Pala Regional Agricultural Quarantine Officer, National Agricultural Research Institute, Rabaul

Mr William Sawag Quarantine Inspector, National Agricultural Research Institute, Rabaul

Mr Luc Leblanc UNV Entomologist, Lowlands Agricultural Research Station, Kerevat

Ms Amanda Mararvai Junior Scientific Officer, National Agricultural Research Institute, Kerevat

Reviewer's Itinerary and Program

- 4 Oct 98 Travel Canberra - Nadi (0650 - 1700 h)
- 5 Oct 98 Nadi: briefing of self and Dr J McWilliam (co-reviewer of ACIAR program CS2/94/03) by A. Allwood: visited Hot Forced Air Facility and discussed current and proposed activities with Sant Kumar; discussion with Professor R Drew
- 6-7 Oct 98 Nadi: Review and presentations by project and national staff
- 8 Oct 98 AM - Nadi: discussion with Dr McWilliam on RMFFP and ACIAR project achievements following review presentations and discussions with participants
PM travel: Nadi - Tonga (1630 - 1850 h)
- 9 Oct 98 Tonga: discussions with (i) Mrs Amanaki, A/Director MAF on project activities, (ii) Mr Foliaki on quarantine issues, and (iii) Mr Tuipuloto at HTFA facility, autolysed yeast production facility at Royal Tongan Brewery
- 10 Oct 98 Tonga: study of additional documents provided at the review meeting and preparation of report
PM travel Tonga - Nadi (2005 - 2035 h)
- 11 Oct 98 Nadi: study of review documents, report preparation
- 12 Oct 98 Nadi: report preparation and discussion with A. Allwood
- 13 Oct 98 Travel Nadi - Port Vila, Vanuatu (1300 - 1400 h)
- 14 Oct 98 Port Vila: discussion with Professor Drew, other staff, inspection of laboratory facilities
- 15 Oct 98 Port Vila: report preparation
- 16 Oct 98 Vanuatu: accompanied Mr Tau and Mr Kanas on trip to service male attractant traps around Efate Island
- 17 Oct 98 Port Vila: report preparation
- 18 Oct 98 Travel Port Vila to Rabaul, PNG via Honiara & Port Moresby (0945 - 1700 h)
- 19 Oct 98 LAES, Kerevat: discussions with project staff on status of RMFFP project progress and future plans, inspected laboratory facilities
- 20 Oct 98 LAES, Kerevat: further discussions with project staff, discussed status of RMFFP project with Mr Wiles, and of quarantine issues with Mr Pala
PM travel Rabaul - Port Moresby (16.30 - 19.30 h)
- 21 Oct 98 Travel Port Moresby - Canberra via Cairns and Brisbane (1130 - 2055 h)

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