INSECT AND PEST CONTROL NEWSLETTER

Joint FAO/IAEA Division
of Nuclear Techniques
in Food and Agriculture and
FAO/IAEA Agriculture and
Biotechnology Laboratory, Seibersdorf

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Vienna

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A. TO THE READER

Dear Colleague,

Poverty is a severe situation, in which affected people cannot cope with key constraints to livelihood and well being. Hunger and malnutrition are extreme forms of poverty and are most intense in the least developed countries (LDC), the majority of which are in Sub-Saharan Africa. It is alarming that according to FAO the proportion of undernourished in the LDC population actually increased from 38% to 40% between 1970 and 1997. As regards trade, LDCs have been further marginalized from world agricultural markets, accounting for only 5% in 1970s but barely 1% in the late 1990s.

In 1996 the FAO held the World Food Summit. This recognized that despite the best attempts of all concerned many people in the world could still not be assured of a daily food supply and that food insecurity remained unacceptably high. Those attending the Summit pledged to focus on sustainably reducing hunger in the world by half by the year 2015. In the following 4 years as the issues relating to hunger and food insecurity in the context of poverty became further debated and, undoubtedly in an effort to put the problems in perspective and scope, the concept has drifted from hunger alleviation to poverty reduction in general. In 2000 at the World Millennium Conference, a series of international development targets were agreed with a global target of reducing by one-half the proportion of people living in extreme poverty by 2015 – a notable shift away from issues of food insecurity.

As FAO prepares for the upcoming World Food Summit – Five Years Later in November 2001 pre-summit papers have again begun to review the situation. It is clear that during the move from a focus on food insecurity and hunger to poverty reduction in general the role of agriculture became considerably down played. Also the recognition of key problems that, in a sequence of development efforts aiming at sustainable poverty reduction, must be tackled first, lost the required focus. But this must be incorrect since chronic hunger is at the root of a vicious cycle of malnutrition, low productivity and hence continuous poverty. Over 800 million people go hungry every day and hungry people will never escape the poverty trap! Two thirds of the poor live in rural areas and 95% of these rely on agriculture both for basic subsistence and for income. Unless the basic need for daily food is addressed in this sector of the population, other approaches to poverty reduction and alleviation are unlikely to succeed. The upcoming World Food Summit – Five Years Later to be held in November 2001 will seek to reaffirm the relief of hunger as the immediate priority issue and aim to find direct ways to address this problem to assure success and the achievement of the original target – the reduction of world's hungry people by one half in 2015.

There are currently 33 countries that have a per caput food consumption under 2200 Kcal and most of these are in sub-Saharan Africa. Improving livestock productivity can have a direct effect on the livelihoods and food security not only of those in the rural areas but the urban populations that are increasingly demanding livestock products as a daily part of their diets. People in Sub-Saharan Africa get less than a third as many calories and half as much protein from animal products as people in developed countries. Notably though in sub-Saharan Africa cattle rearing is enormously constrained by a unique Sub-Saharan problem, the presence of tsetse fly, and the critical role played by cattle in rural development is severely constrained or absent.

The role for cattle is more complex than merely providing a food source and income. Cattle are frequently the main source of power for ploughing of the land and for transport, and thus represent an essential component for significantly increasing crop productivity. Furthermore the presence of cattle provides a constant source of fertilizer for the soils and a completion of the important nutrient cycle between plants, soils and animals. This mixed farming approach of crop and livestock is practiced by over 80% of farmers in the developing world but is not an option in many areas of Sub-Saharan Africa due to the presence of the tsetse fly. In addition, in many marginal areas where crop production is difficult due to poor soils and lack of water, livestock rearing provides a realistic agricultural alternative to arable farming. Cattle also act as a longer term "bank" and can provide materials for clothing, housing and heating.

The FAO/IFPRI/ILRI Vision 2020 report on the new livestock revolution furthermore highlights that the landless and the poorest of the poor will benefit most from improved livestock, and many people living in nowadays "developed" countries tend to forget their own families' past, only a few generations ago, when the availability of a milk cow, often kept indoors, permitted small rural families to escape poverty. This is not different for the African poor. But in Sub-Saharan Africa productive cattle maintenance is not a viable option due to the presence of tsetse fly.

Thus tsetse and trypanosomosis are clearly at the root of low agricultural productivity in Sub-Saharan Africa and the removal of this factor would be a major contributor for large-scale poverty reduction in this region. Whilst removal of the disease would allow other constraining issues to become priorities such as the presence of other disease, lack of feed, poor husbandry skills and lack of markets for dairy products, without the removal of the threat of trypanosomosis there can be no progress, and for many in this region, no way out of staying hungry.

So lethal is the disease African trypanosomosis (sleeping sickness in humans and nagana in cattle) that is transmitted by tsetse, and so difficult is its control, that over 10 millions square kilometers infected with tsetse fly prohibit the rearing of cattle. There are no vaccines for protection (nor any likelihood of ones for the future) and the drugs used for treatment of cattle are expensive and increasingly becoming ineffective. The critical lack of productive cattle in this vast area of Africa has been recognized for many years and a considerable number of control approaches have been tried. Whilst many of these have had short-term success the problem remains as great as ever. Recent concepts of farming livestock in tsetse infected areas through a variety of community-led vector control strategies have been shown to be untenable and discussions have returned to area wide concepts of vector control and eradication.

Significantly though, during the past five years there has been an increasing awareness that the final elimination of the tsetse fly from areas can be achieved through the integrated use of the sterile insect technique (SIT). Reduction of tsetse fly populations has always been achievable but not sustainable. The area-wide application of SIT offers a realistic, affordable and environmentally acceptable way to complete the task by eliminating the final remaining flies. Although the effective use of SIT for fly elimination requires a reduction of fly populations by around 95%, this has often been achieved but not sustained due to the recurrent cost and logistics of fly control. The fact that use of SIT can achieve final eradication of the fly and hence the disease has been dramatically demonstrated on the island of Zanzibar.

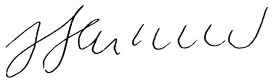
Recognizing this fact and in response to the increasing problem of African trypanosomosis, the Heads of African States and Governments, at their 36th Summit Meeting in Lomé, Togo, 10-12 July 2000, adopted a Decision on Proposal for Eradication of Tsetse Flies on the African Continent. In this decision, AHG/Dec.156 (XXXVI), the Assembly of Heads of States commended those African

countries that have initiated the application of the SIT for their pioneering effort, and invited the OAU to lead the establishment of a Pan-African Tsetse and Trypanosomosis Eradication Campaign (PATTEC).

The Programme Against African Trypanosomosis (PAAT), which is a forum for major stakeholders and international organizations including FAO, IAEA, OAU and WHO to harmonize and coordinate their efforts against tsetse/trypanosomosis, have welcomed the historic declaration of the African Heads of State and Government and endorsed the ultimate objective of eradication. In the context of implementation of the Decision by the Heads of State, the OAU Secretary General has requested IAEA and FAO to strengthen their collaborative efforts and to provide specific support in the planning and implementation of PATTEC. Subsequently, FAO and IAEA have now initiated a joint undertaking to develop tsetse intervention strategies in priority agricultural development areas including the moist savannah belt in West Africa.

It is clear that elimination of tsetse will be a formidable task and will need to commence with achieving fly elimination in carefully selected areas with good possibilities of success and appropriate levels of agricultural potential. Issues of land use planning, aiming at a more responsible management of available natural resources, of cattle management, of marketing will need to be addressed in parallel. What is perhaps more important at this point in time though, is the recognition by international organizations donor and developing countries alike, that an opportunity has now arisen that offers the international development community a real possibility to directly tackle one of the major underlying causes of hunger and poverty in the worlds poorest region.

Yours sincerely,



Jorge Hendrichs
Head, Insect Pest Control Section

B. STAFF

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C. FORTHCOMING EVENTS

I. Research Co-ordination Meetings (RCM)

"Evaluating the Use of Nuclear Techniques for the Colonisation and Production of Natural Enemies", 18–23 June 2001, Tapachula Mexico; 2nd RCM.

"Automation in Tsetse Mass-rearing for Use in Sterile Insect Technique Programmes", 7 – 13 July 2001, Addis Ababa, Ethiopia; 4th and Final RCM.

"A Molecular and Genetic Approach to Develop Sexing Strains for Field Application in Fruit Fly SIT Programmes", 10 – 14 July 2001, Sydney, Australia; Final RCM.

"Quality Assurance of Mass Produced and Released Fruit Flies", 19-23 November 2001, Mendoza, Argentina; 2nd RCM.

"Genetic Sexing and Population Genetics of Screwworms", 5-14 February 2002, Campiñas, Brazil; 1st RCM and Workshop.

"Enhancement of the Sterile Insect Technique through Genetic Transformation Using Nuclear Techniques", 18-22 February 2002, Hawaii, USA, Final RCM.

"Improved Attractants for Enhancing the Efficiency of Tsetse fly Suppression Operations and Barrier Systems Used in Tsetse Control/Eradication Campaigns". 18 - 22 March 2002, Entebbe Uganda, 4th and Final RCM .

"Development of Improved Attracants and their Integration into Fruit Fly SIT Management Programmes" 29 April – 3 May 2002, Stellenbosch, South Africa, 2nd RCM.

II. Consultants Meetings

"Consultants Meeting on Transboundary Shipment of Sterile Insects" 30 July – 3 August 2001; IAEA, Vienna, Austria.

"Consultants Meeting on Developing Guidelines for Fruit Fly Trapping" 20-24 August 2001 – IAEA, Vienna, Austria.

"Consultants Meeting on Risk Assessment of Transgenic Arthropods" 3-7 September 2001, FAO, Rome, Italy.

III. Other Meetings

7th Committee Meeting of the Programme Against African Trypanosomiases , 3 days in the week 25–29 June 2001 (venue to be decided).

Regional workshop on "Using GIS for Data Management and Analysis" for the Near East, 2-6 July 2001, IAEA, Vienna, Austria.

Workshop of the International Consultative Group on Food Irradiation (ICGFI) Latin American Region, on certification of irradiation as a sanitary and phytosanitary treatment for food and agricultural commodities. 9 –13 of July, 2001 (Miramar Palace Hotel, Ave Atlantica, 3668, Copacabana, Rio de Janeiro, RJ, Brazil CEP).

Regional workshop on "Medfly Monitoring and Fruit Sampling" for the Near East, organized by the Arava Medfly Eradication Project (AMEP) in collaboration with the

IAEA, 26-30 August 2001, Sapir Center, Israel.

International Fruit Fly Course organized by the Moscamed Program in close cooperation with the IAEA. Tapachula, Chiapas, Mexico, August/September, 2001 (dates to be decided).

26th meeting of the OAU International Scientific Council for Trypanosomiasis Research and Control (ISCTRC), 1-5 October 2001, Ouagadougou, Burkina Faso.

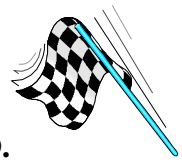
Regional workshop on "Fruit Fly Identification" for the Near East Co-organized by the Ministry of Agriculture and the Ministry of Energy and Mineral Resources in collaboration with the IAEA, 21-24 October 2001, Aqaba, Hashemite Kingdom of Jordan.

First Meeting of the MERC Management Committee for Medfly SIT Projects in the Near East, 28-30 October 2001, Aqaba, Hashemite Kingdom of Jordan (dates and venue to be confirmed).

Meeting of Project Coordination Group of Regional Project RLA/5/045 "Establishing Pilot Fruit Fly-Free and Low Prevalence Areas Using an Area-wide Integrated SIT Approach in Central America and Panama", Panama, October 2001.

IV International Meeting of The Working Group of Fruit Flies of The Western Hemisphere, 25-30 November 2001; Mendoza, Argentina. For additional information please contact the local organizer Ing. Oscar De Longo iscamen@cpsarg.com or Pedro Rendon prendon@guate.net

6th International Symposium on Fruit Flies of Economic Importance, Stellenbosch, South Africa. For more information check the website: www.fruitflysymposium.co.za



D. PAST EVENTS (2000-2001)

I. Research Co-ordination Meetings (RCM)

"Development of Improved Attractants and their Integration into SIT Fruit Fly Management Programmes", 28 August - 1 September 2000, Sao Paulo, Brazil, 1st RCM.

"Enhancement of the Sterile Male Technique Through Genetic Transformation Using Nuclear Techniques", 14 - 18 August 2000, Sao Paulo, Brazil, 3rd RCM.

"Improved Attractants for Enhancing the Efficiency of Tsetse Fly Suppression Operations and Barrier Systems used in Tsetse Control/Eradication Campaigns", 21 - 25 February 2000, Bamako, Mali. 3rd RCM.

"Genetic Applications to Improve the SIT for Tsetse Control/Eradication including Population Genetics" RCM, Rome, Italy, 19-23 March 2001.

The proceedings of these meetings are available on request at the Insect Pest Control Section's office.

II. Consultants and other Planning Meetings

"First Planning Meeting on Development of the Sterile Insect Technique for Control of Malaria-Transmitting Mosquitoes", 5-8 June 2001; IAEA, Vienna, Austria.

"Second Meeting of the National Project Counterparts for the Fruit Fly SIT Projects in the Middle East", 26-28 March 2001; IAEA, Vienna, Austria.

"Consultants Meeting on Tsetse Suppression", 5 – 8 February 2001; IAEA; Vienna, Austria.

"Thematic Planning Meeting on Establishing Tsetse Fly Free Zones through Area-wide Tsetse Intervention Involving the SIT", 29 January – 2 February 2001; IAEA; Vienna, Austria.

"Preparatory Meeting on the Central American Regional Fruit Fly SIT Project", 16 – 19 January 2001; IAEA, Vienna, Austria.

"Improvement of Codling Moth SIT to Facilitate Expansion of Field Application", 30 October - 3 November 2000; IAEA, Vienna, Austria.

"Rational Supply of Sterile Flies for Medfly SIT in the Mediterranean Basin", 14 – 15 August 2000; IAEA, Vienna, Austria.

"Genetic Sexing and Population Genetics of Screwworm", 7-11 August 2000; IAEA, Vienna, Austria.

"Development of cost effective diets for mass production of tsetse flies", 17 - 21 July 2000; IAEA, Vienna, Austria.

The proceedings of these meetings are available on request from the Insect Pest Control Section's office.

III. FAO/IAEA Training Courses

The Interregional Training Course on the "Use of the Sterile Insect and Related Techniques for the Area-Wide Management of Insect Pests", University of Florida, Gainesville, Florida, USA, 11 April – 17 May 2001. (Co-funded by the US Government, FAO and IAEA.).

WHO/IAEA "First International Course on African Trypanosomoses", 23 October - 10 November 2000, IMTSSA, Le Pharo, Marseille, France.

FAO/IAEA Regional Training Course on Old World Screwworm, 6 - 14 June 2000, Teheran, Iran.

FAO/IAEA Regional Training Course on "The Sterile Insect Technique as a Component for Integrated Area-wide Tsetse and Trypanosomosis Management", 20 March to 14 April 2000, Tanga, Tanzania.

IV. Other Meetings

The International Conference on Control of Old Screwworm Fly in Some Countries of the Middle East. Arab Organization for Agricultural Development (AOAD), Manama, Bahrain, 9-12 April, 2001.

Pan African Tsetse and Trypanosomosis Eradication Campaign (PATTEC). Task force meeting on a Continental Plan of Action for the Eradication of Tsetse and Trypanosomosis. 7-16 December 2000, Nairobi, Kenya.

Programme Against African Animal Trypanosomosis (PAAT) Committee Meeting, 22 - 23 November 2000, Geneva, Switzerland

Workshop On Peach Fruit Fly (*Bactocera zonata*), 13 – 15 November 2000, Valencia, Spain.

Course on Differential Diagnosis of Old World Screwworm and other Myiasis Fly Larvae, 16 – 20 October 2000, Natural History Museum, London, United Kingdom.

Red Palm Weevil and Peach Fruit Fly Study Tour/Workshop, 16-19 October 2000, Cairo, Egypt.

FAO Regional Workshop on Screwworm Strategies in the Caribbean, 16 September 2000, Panama City, Panama.

"The use of Genetic and Copulation Ecology in Successful Areawide Programmes to control Insects", XXI International Congress of Entomology, 20 - 26 August 2000, Iguassu Falls, Brazil.

Course on Differential Diagnosis of Old World Screwworm and other Myiasis Fly Larvae, 17 – 21 July 2000, Natural History Museum, London, United Kingdom.

Regional Forum for Africa on Tsetse SIT, 19 - 20 June 2000, Addis Ababa, Ethiopia.

International Screwworm Meeting, Mexico-USA Screwworm Commission, Tuxtla Gutierrez, 27 - 30 March 2000, Chiapas, Mexico.

Workshop to review the Agricultural Research Service (ARS) program on exotic pests, fruit flies and quarantine, 24 - 26 January 2000, Honolulu, Hawaii, USA.

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E. TECHNICAL CO-OPERATION PROJECTS

The Subprogramme has currently technical responsibilities for the following technical co-operation projects. They fall under five major areas, namely:

- Tsetse
- Fruit flies
- Old and New World Screwworm
- F-1 Sterility for the Control of Lepidopteran Pests
- *Anopheles arabiensis* mosquitoes

Operational Projects (2001-2002) are:

EGY/5/025 Area-Wide Fruit Fly Control in Eastern Egypt
ETH/5/012 Integrating SIT for Tsetse Eradication
INT/5/145 Promotion and Transfer of Sterile Insect Technology
ISR/5/010 Upgrading the Area-Wide Control of the Mediterranean Fruit Fly using the Sterile Insect Technique
JAM/5/007 New World Screwworm Eradication
JOR/5/009 Upgrading the Area-Wide Control of the Mediterranean Fruit Fly using the Sterile Insect Technique
KEN/5/022 Integrated Area-Wide Tsetse and Trypanosomosis Management in Lambwe Valley
MAR/5/009 Control of Diamondback Moth by Sterile Insect Technique
MLI/5/017 Integrated Control of Animal Trypanosomosis through creation of a Tsetse Fly Free Zone
PAL/5/002 Area-wide Application of SIT for Medfly Control
RAF/5/051 SIT for Tsetse and Trypanosomosis Management in Africa
RAF/5/052 SIT Development for Control of *Anopheles arabiensis* Mosquitoes
RAW/5/008 Preparing to Combat the Old World Screwworm in West Asia
RLA/5/044 Preparing Caribbean Eradication of New World Screwworm
RLA/5/045 Establishing Pilot Fruit Fly-Free and Low Prevalence Areas using an Areawide Integrated SIT Approach in Central America and Panama
SAF/5/002 Sterile Insect Technique Integrated Management of Fruit Fly (Phase II)
SAF/5/005 Situation Analysis of the Feasibility and Desirability of Tsetse Fly Eradication
SLR/5/002 Feasibility Study for a Mass Rearing Insect Facility
THA/5/046 Area-Wide Integrated Control of Fruit Flies
TUN/5/019 Control of the Date Moth using Radiation Sterilization.
TUN/5/020 Establishment of a Medfly Mass-Rearing Facility and Introduction of a Pilot Sterile Insect Technique Control Programme
UGA/5/023 Integrated Sterile Insect Technique Based Intervention against Tsetse in Buvuma Island
URT/5/018 Post Eradication Entomological and Veterinary Monitoring on Zanzibar
URT/5/019 Support to National Tsetse and Trypanosomosis Management

In keeping with our policy to highlight activities in a few of our Technical Co-operation projects in each Newsletter the following projects are discussed in this issue:

STEP – Tsetse Fly Eradication in Ethiopia (ETH/5/012)

In 1997, at a time when the international appreciation of the area-wide concept for intervention against tsetse flies in general and of the Sterile Insect Technique (SIT) in particular was still rather limited, the Government of Ethiopia, with the support of IAEA-TC and the Joint FAO/IAEA Division, initiated the Model Project on Tsetse Fly Eradication from the Southern Rift Valley of Ethiopia, also called STEP (Southern Tsetse Eradication Project).

Meanwhile there are a number of African countries that are interested in the application of the SIT for tsetse eradication. African countries established under the auspices of the OAU a Pan African SIT Forum, in which specialists in Africa exchange experience and foster the advancement of methods development and of the application of tsetse SIT. The 36th Summit of African Heads of State and Government, held in Lomé, Togo, in July 2000, commended those African countries that have lead in applying the SIT for the eradication of tsetse flies and requested the OAU Secretary-General to consult with and seek support and co-operation from all possible partners in the implementation of the Pan-African Tsetse and Trypanosomosis Eradication Campaign. (PATTEC), which is expected to be officially launched this year. The Ethiopian initiative certainly spearheaded these developments.

STEP itself had two major objectives upon its initiation:

1. National capacity and capability building in the application of the SIT for pest management in general and for the eradication of tsetse flies in particular.

2. Application of the SIT and eradication of a tsetse fly species (*Glossina pallidipes*) from a 2.5 million hectare area in the Southern Rift Valley of Ethiopia.

In this regard the project has, in the last years:

1. Established well-staffed and well-equipped main and branch offices and Field Operational Teams.

2. Established two insectaries and a temporary mass rearing facility with a capacity to rear over 150,000 tsetse flies.

3. Completed the design work for the construction of a modern mass rearing facility with a capacity of 10 million tsetse flies.

4. Established a Geographic Information Systems (GIS) Unit at the Geology and Geophysics Department of the Addis Ababa University. The unit meanwhile provides relevant technical support to the project, serves in teaching and research activities and provides services to other groups in the Ethiopia and neighbouring countries.

5. Provided equipment, trained two experts and established a diagnostic laboratory for the Animal Health Research Centre of the Ethiopian Agricultural Research Organisation (EARO). The diagnostic laboratory uses ELISA for determining the trypanosomosis prevalence in the project area.

6. Provided short and long term training to forty professional staff from all tsetse and trypanosomosis affected regions of Ethiopia on GIS, tsetse mass-rearing, tsetse suppression, entomology and veterinary epidemiology.

7. Collected and analysed geo-referenced entomological and parasitological baseline data from a “block-1”, the northern 10,500 km^2 of the project area; established the necessary data collection frame and prepared a work plan for environmental and socio-economic surveys in the project area. This baseline data collection effort is meanwhile recognised by several partners in and outside

Ethiopia as a model for thorough situation assessment prior to tsetse / trypanosomosis intervention activities and as an essential basis for a more responsible modification of land use patterns.

Although the project is truly an Ethiopian project that gets full and sustained support from the Government of Ethiopia, the technical and financial support received from FAO/IAEA and IAEA-TC, respectively, and the extrabudgetary contributions provided by other partners, particularly the USA, were crucial in successful implementation of this first phase.

In the forthcoming months, after the completion of the baseline data collection exercise and a corresponding revision of the approach, tsetse suppression activities will be initiated. Results from first test releases of sterile males, which are the basis for the subsequent operational application of the SIT, are expected to be available in early 2002. Information provided by Assefa Mebrate, National Project Coordinator and Chairman of the Pan-African Tsetse SIT Forum.

Sterile Insect Technique Integrated Management of Fruit Fly (Phase II) (SAF/5/002)

According to the table grape growers of the Hex River valley in the Western Cape Province, the IAEA pilot project, which started 4 years ago as a feasibility study with the objective of demonstrating the cost-effective use of this environment-friendly technology for control rather than eradication, has been a major success. As a result of replacing insecticide applications with aerial releases of sterile males, medfly populations were effectively suppressed throughout the 1990-2000 and the 2000-2001 seasons in the Hex River valley, a major table grape exporting area. Also secondary pest outbreaks on grapes have been reduced significantly as their natural enemies are no longer killed due to insecticide exposure. Most importantly, rejections of boxes of table grapes from this valley by inspectors of importing countries due to the presence of the medfly were reduced by over 60%. This represents a substantial increase in revenue to the local fruit industry and these positive results are leading other fruit grower associations to the preparation of further SIT projects in the Western Cape Province. Furthermore, this success has recently been recognized by the Western Cape Government, which has allocated R.1.5 million to expand the small sterile medfly production facility at INFRUITEC in Stellenbosch to increase the ability to produce routinely the required numbers of sterile males.

One fruit production area that is considering the use of SIT is the citrus exporting area in Citrusdahl. In this area an additional key pest is the false codling moth, which is resistant to most insecticides. A rearing laboratory produces the false codling moth *Cryptophlebia leucotreta* (Meyrick) and an egg parasitoid of this pest. The mass rearing technologies for this pest still have to be developed and the IAEA is supporting this applied R&D through a research contract.

Establishing Pilot Fruit Fly-Free and Low Prevalence Areas Using an Areawide Integrated SIT Approach in Central America and Panama (RLA/5/045)

Considering that fruit flies are a key limiting factor for the development of the fruit industry in Central America and Panama and following the guidelines of the Thematic Plan For Fruit Fly Control Using The Sterile Insect Technique prepared together by IAEA, FAO and a group of outside experts in November 1999, the Agency's Board of Governors approved in November 2000, TC project RLA/5/045 to address the fruit fly problem in the Central American region.

The project's general objective is to establish one pilot fruit fly low prevalence or free area in each Central American country and Panama for fruit exports to fly free markets. This objective will be approached through the integration of pre and post control activities including the use of the Sterile Insect Technique (SIT) where appropriate and post-harvest treatments when required.

The first project co-ordination meeting was held in Vienna in January 2001, with participation of all Central American countries and Panama and the regional and international partner organizations (IICA, OIRSA, USDA, FAO). A project document was presented and discussed in the meeting. The document was approved as the project master plan that includes, among other issues, the project management structure and a general work plan. The management structure is formed by a Project Coordination Group (PCG) integrated by all project participants, including the NPPO's and the regional and international plant protection organizations. The role of the PCG is to provide leadership by setting the projects directives. The daily management and coordination effort will be done through a Project Regional Manager (RM) and the assigned country project coordinators. Implementation of project activities will be the role of the NPPO's in close collaboration with the fruit industry (see project management structure).

To follow-up the agreements and recommendations of the meeting in Vienna, the first project workshop was organized and held in Costa Rica on 26 and 27 April 2001. Participants were all project partners, including the NPPO's and the regional and international plant protection organizations.

A relevant subject was the discussion on the integration, under a single framework, of the different fruit fly projects currently being carried out in the region. The projects are: 1) OIRSA/USDA-FAS in Honduras and Nicaragua; using Mitch funds, 2) FAO TCP/RLA/0172 (A) in Belize, Costa Rica and Panama and 3) IAEA in all Central American countries and Panama. Since these three projects have basically the same objective, which is the development of pilot fruit fly low prevalence and free areas through an integrated control approach for fruit exports, it was decided to assemble all three projects under the PCG represented by all the institutions involved. This institutional alliance will allow the different expertise and resource to complement each other and will provide strength and stability to the project.

The most relevant results and agreements of the workshop include:

1) The Project Coordination Group (PCG), accepted the project document as the master plan for project implementation. The main challenge was to prepare the project work plans and to assemble the available resources from the three projects in a way that all project activities could be covered. Work plans and budgets for each country were prepared under the general project framework described in the project master document.

2) In order to export fruits from fruit fly low prevalence areas, it was confirmed by project participants that control activities in orchards most be complemented with post-harvest activities including the use of post-harvest treatments. The countries agreed that the use of irradiation as a post-harvest treatment for fruit commodities has a prominent future and requested the IAEA to support the countries in setting the basis for future application of this treatment.

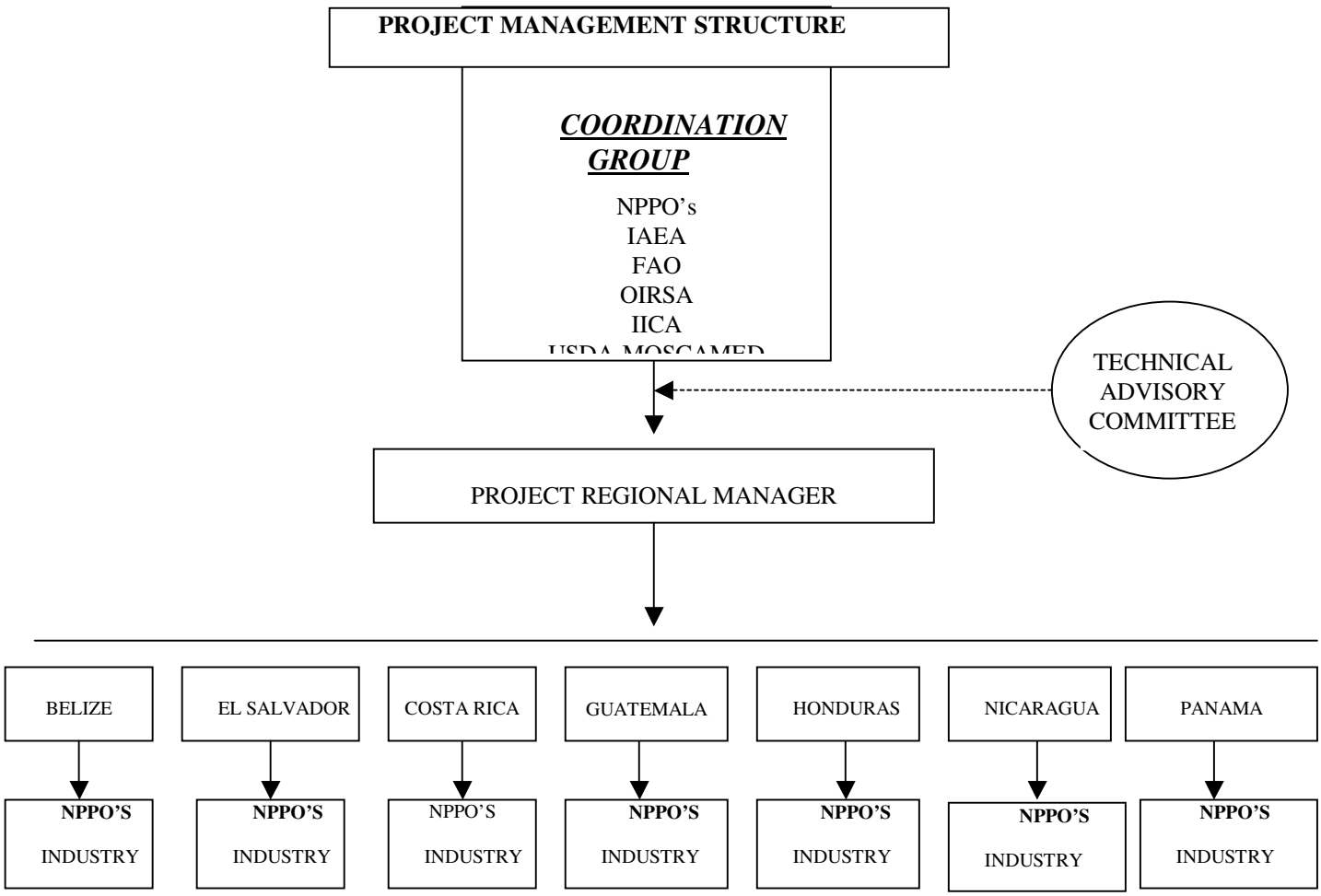
3) El Salvador, who was not able to attend the first co-ordination meeting held in January in Vienna at the IAEA headquarters, agreed on the basis of the project structure and committed qualified staff and infrastructure to the project.

4) The NPPO's will immediately assign a national co-ordinator for the fruit fly project to actively interact with the IAEA Project Regional Manager based in Costa Rica.

5) The next meeting of the PCG will be held in Panama during the last week of October 2001.

The basic elements of the project including definition of a management structure, preparation of detailed work plans and budgets have been covered. During the following months the implementation phase will start with staff training through scientific visits and fellowships, participation in the MOSCAMED International Fruit Fly Course and expert missions to carry out feasibility studies including economic studies, pest risk analysis and market studies.

Implementation of the work plan will continue to be closely monitored and the second project workshop has been scheduled for the last week of October 2001 in Panama.



F. ONGOING AND PLANNED CO-ORDINATED RESEARCH PROJECTS

Third Research Co-ordination Meeting on "Genetic Applications to Improve the SIT for Tsetse Control/Eradication including Population Genetics" Rome, Italy, 19-23 March 2001, (D4.20.05).

The CRP focuses research on the population genetics of tsetse as a tool in the management of tsetse SIT programmes, using a range of modern techniques, with emphasis on the requirements of the tsetse eradication project in the Southern Rift Valley of Ethiopia.

The second RCM was held from 3 - 7 October 1999, in Mombasa, Kenya in conjunction with the 25th OAU/STRC ISCTRC Meeting.

The following text presents a summary of the most relevant results discussed during the 3rd RCM held 19-23 of March 2001, at FAO, in Rome, Italy.

The recent declaration of the African Heads of State and Government on the eradication of tsetse from the African continent has resulted in the planning of extensive tsetse intervention programmes incorporating the SIT. A key component in the identification of target populations is to delimit the degree of their isolation from other populations; a very powerful tool to aid in this decision making is population genetic analysis.

A second component of target population identification is the use of GIS mapping technology. Much of this GIS technology is being developed in FAO and the current meeting was held in Rome in order to facilitate the development of integrated maps incorporating both genetic and geographic information. The meeting was hosted by the Animal Production and Health Division (AGA).

The results reported in the meeting confirm previous analyses that showed there is a surprisingly high level of population structuring in tsetse, even over quite small geographic distances. However, adequate sampling has not been carried out over a sufficiently wide geographic area and this remains a major constraint to understanding fully tsetse population structure.

New analytical procedures were presented on the immune response of tsetse related to the study of vectorial capacity. Trypanosomes appear to be able to block the expression of some anti-pathogen genes in the fly and thus enhance their chances of infecting the fly. These studies, together with the demonstration of a genetic transformation system in tsetse, could eventually lead to development of refractory strains.

Polytene chromosome maps are now available for *G. austeni*, *G. pallidipes* and *G. morsitans submorsitans*. Banding pattern analysis has revealed the presence of many inversion differences between the species. So far no field populations have been analysed to see if there are floating inversions as there are in mosquitoes and black flies. A sex-distorter phenotype in *G. m. submorsitans* was shown to be associated with complex inversions on an X chromosome.

The frequent occurrence of hybrid sterility, when tsetse from different taxa are crossed, may provide an additional component to SIT. Data from many different crossing schemes illustrated the complexity of the hybrid phenotype but identified several situations in which females could be permanently sterilized following mating with a male from a different taxa.

A major advantage of holding the meeting at FAO in Rome was that the participants were able to hear presentations from staff of the Agriculture Department on how AGA/FAO uses the area-wide approach when dealing with plant pests and infectious diseases in animals.

The 4th and final RCM will tentatively be held in Edmonton, Canada, in 2002.

Expected duration: 5 years (1997-2002).

Contract Holders (3) from: Greece, Kenya and Burkina Faso.

Agreement Holders (6) from: Greece, Kenya, Belgium, Canada, United States (2) and Italy.

New CRP on Genetic Sexing and Population Genetics of Screwworms (D4.20.09)

A very successful area-wide programme for the eradication of the New World Screwworm (NWS) has been carried out in North and Central America. A Thematic Plan for both NWS and OWS (Old World Screwworm) identified several technical constraints for the further expansion of SIT for these two species and these form the core of this new CRP. Any expansion of the NWS programme into the Caribbean and South America will require information on the target populations in that large area where very little is known concerning the distribution and levels of population isolation. In addition, the size of the populations to be targeted and the area over which they are distributed will require that economies be made in fly production and release costs. One way to achieve this would be to develop a genetic sexing strain for NWS. For SIT to be effectively developed for the OWS much data is needed on distribution and the genetic relationships of populations from S. E. Asia to the Middle East and Sub-Saharan Africa. The CRP will address these high priority areas.

Expected duration: 5 years (2002 – 2006).

1st RCM and Workshop: 9-14 February 2002, Campinas, Brazil.

We encourage behaviourists, population ecologists and insect population geneticists from the relevant countries research institutions or universities to put forward proposals for this coordinated research project.

Enhancement of the Sterile Insect Technique (SIT) through Genetic Transformation Using Nuclear Techniques (D4.10.12)

The third RCM was held in Sao Paulo, Brazil on 14-18 August 2000. The meeting was attended by 8 participants of this CRP and three observers. The group presented the results of the research conducted over the last 18 months and discussed the developments and opportunities for future work.

Since the last RCM, the participating laboratories have been very successful in generating a range of novel vectors, genes, regulatory elements and approaches which have the potential for incorporation into the SIT. Medfly remains the essential model for the development of the transgenic technology for the SIT. However, it is foreseen that the major impact and opportunities for exploiting this technology will be the development of genetic sexing systems for other key pest species that are the target for SIT and where the background knowledge in genetics/cytology is lacking.

Over the forthcoming period, the participating laboratories will be well placed to begin the move from laboratory-based research to consider the more applied aspects of using transgenic technology to the benefit of the SIT. This will include studies on the genetic behavior of transgenic insects, e.g. stability of transgenic strains over extended periods of time and under less favorable rearing conditions.

It is planned to hold the last RCM in Honolulu, USA, from 18-22 February 2002. Dr. D. Haymer (University of Hawaii) has agreed to serve as local organizer for this final meeting.

Expected duration: 7 years (1995-2002).

Contract Holders (2) from: Greece and from New Zealand

Agreement Holders (8) from: United Kingdom, United States (4) and Italy (3).

A Molecular and Genetic Approach to Develop Sexing Strains for Field Application in Fruit Fly SIT Programmes (D4.10.15)

The third RCM was held in Tapachula, Mexico from 12-16 July, 1999.

During the course of the CRP genetic sexing strains have been introduced into mass rearing facilities in Argentina, Guatemala, Chile, Madeira and Crete. In addition Hawaii, South Africa, Peru and Western Australia are preparing to rear genetic sexing strains. The expertise developed in the CRP has been essential in order that this technology transfer meets the needs of the customer. In other fruit fly species, progress towards the development of genetic sexing strains has been made in the areas of polytene chromosome analysis and the isolation of genetic markers. There is also an increasing emphasis on the use of molecular techniques targeted to the cloning of sex determination genes.

The CRP has been extended for a further year, and the final RCM will be held in July 2001 in Sydney, Australia.

Expected duration: 5 years (1995-2001).

Contract Holders (5) from: Argentina, Brazil, Greece, Guatemala, and the Philippines.

Agreement Holders (3) from: Australia, Italy and the United States.

Development of Improved Attractants and their Integration into Fruit Fly SIT Management Programme (D4.10.17)

The first Research Coordinated Meeting (RCM) for development of improved attractants for female fruit flies and their integration into fruit fly SIT management programmes took place from August 28 to September 1, 2000, in Sao Paulo, Brazil. Eighteen professionals from 13 countries and 4 subregions participated in the meeting most of them as contract holders and some as observers. A consensus was reached on a standard protocol for the core experiments and on the side experiments that will be carried out during the first phase of this CRP following protocols developed by the participants. Lists of materials required for the first year experiments were prepared and delivery schedules for supplying them. Participants will be presenting the results of

the first experiments as well as a progress report of the second year experiments by April 2002 in the next RCM to be held in Stellenbosch South Africa. All the relevant documents and papers that were presented during the meeting have been compiled in this single document for consultation. Technical details including the standard research protocol, fruit fly conditions in each country, species being addressed, list of participants and material requirements can be found in this report.

Expected duration: 5 years (1999-2003).

Contract Holders (3) from: United Kingdom, Portugal and France.

Agreement Holders (15) from: Argentina, Brazil (2), Colombia, Costa Rica, Greece, Honduras, Israel, Mauritius, Mexico, Pakistan, Spain (2), USA (2).

Automation in Tsetse Fly Mass Rearing for Use in Sterile Insect Technique Programmes (D4.20.06)

Several stages in the mass production of tsetse have been addressed so far. Progress has been good in the automated stocking of production cages, where it is now possible to emerge flies under controlled conditions into production cages to give the desired female to male ratio of 4:1 with less than 0.5% females remaining in the un-emerged pupae, for *G. austeni, G. fuscipes fuscipes, G. brevipalpis* and *G. pallidipes*. The necessary conditions for other species remain to be determined. The procedure was successfully transferred to a large *G. pallidipes* colony. This system eliminates manual handling of adult flies for sex separation for purposes of mass rearing and release. The major requirements for the system to work are, pupae must be collected daily and incubated and emerged under carefully controlled conditions. Protocol has been distributed to the participating centres.

After emergence of the females, the remaining male pupae have to be handled. Work is now underway on controlling the emergence of these males by manipulating the holding temperature to allow synchronous emergence, and on chill holding of the adult males in preparation for release. At 15°C pupae can be stored up to 3 days without affecting the emergence rate, survival without blood and mating behaviour of males.

Work on an improved system to handle cages for feeding is progressing well (Tsetse Production Unit TPU2). A first fully automated prototype (TPU1) proved to be too complicated and a second prototype is now undergoing trials and shows good promise of reducing the effort of cage handling by approximately ten fold. The system holds 63 large cages on a single trolley that can be moved to feed all the cages simultaneously and then returned to the larval collecting unit. Prototypes of the new system have been supplied to TTRI (Tanzania), KETRI (Kenya) and Addis (Ethiopia) for field evaluation using existing cages, and the locally available tsetse species. The system has also been further modified to incorporate recommendations resulting from the recent 3rd RCM held in Vienna in April 1999. The third generation TPU 3 has been designed and constructed and is under going evaluation at Seibersdorf. The difference between this system and TPU 2 is that for TPU 3 blood is moved to the flies while the cage holding system is stationary.

Other work has looked at the handling factors affecting flight ability of irradiated males, increasing cage holding density by the use of inserts, energy saving and blood decontamination. This last is a very important factor in the running of large colonies, and the possibility of using pasteurization or UHT sterilization is being investigated.

The 4th and final RCM is scheduled for July 2001 in Addis Ababa, Ethiopia.Expected duration: 6 years (1995-2001).

Contract Holders (5) from: Austria, Czech Republic, Burkina Faso, Tanzania and Kenya.

Improved Attractants for Enhancing the Efficiency of Tsetse Fly Suppression Operations and Barrier Systems Used in Tsetse Control/ Eradication Campaigns (D4.20.08)

This CRP aims at alleviating the shortcomings in attractants for a number of important tsetse species where the standard odours used for *Glossina morsitans* and *G. pallidipes* are poor or ineffective, and in general to try to improve attractant effectiveness for a) entomological monitoring, b) tsetse population suppression and c) barrier maintenance.

The 3rd Research Co-ordination Meeting took place in Bamako, Mali, 21-25 February 2000 and was attended by 8 participants and numerous observers. In the months preceding the meeting, molecules that are stereo-isomerically related to known natural tsetse kairomones have been synthesised and tested in laboratory experiments and field trials. In addition, an effort was made to identify locally available inexpensive sources of visual and chemical attractants.

Among the odours tested in the coastal region of Kenya for *G. austeni, G. pallidipes* and *G. brevipalpis*, octyl formate and decyl formate proved attractive. Preliminary studies reveal that racemic octenol increases capture rate of *G. brevipalpis* males. Coconut oil increases capture rate of *G. austeni* and *G. pallidipes*.

Preliminary field studies placing electrified grids close to pyramidal traps on Buvuma islands, Lake Victoria, Uganda, revealed that of the synthesised attractants decylformate and racemic octenol significantly increased the number of attracted (but not trapped) female *G. fuscipes fuscipes*. Alternative trap designs for *G. f. fuscipes* (e.g. the H-trap) will be explored in combination with different odour combinations, in order to combine increased attractiveness with higher rate of trap entry.

The antennal chemoreceptors of *Glossina brevipalpis* and *G. pallidipes* show responses to plant secondary products, as indicated by electroantennogramme assays of essential oils. Preliminary wind tunnel experiments indicate that some plant secondary products also evoke behavioural responses from tsetse.

As conventional PVC or fibreglass leg panels are expensive and heavy to carry, efforts were undertaken to develop lighter and less expensive leg panels for trapping *G. austeni.* The leg panel made from wire framework and royal blue polyethylene (1000 gauge / 150 mm) appears to meet these requirements and holds Temoocid® (the sticky substance) for sufficiently long placement period (> three months).

Gas-chromatographic and mass-spectrometric analyses of the oxidative degradation process of methyl linoleate, a model for linoleic acid containing vegetable oils, revealed the formation of (±) 1-octen-3-ol, suggesting the use of these oils as low-cost octenol sources in field traps.

The 4th and Final RCM is scheduled for Entebbe, Uganda 18-22 March, 2002.

Expected duration: 5 years (1995-2002).

Contract Holders (7) from: Mali, Burkina Faso, Kenya, Uganda, Tanzania and Hungary. Agreement Holders (2) from: Switzerland and the United States.

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Quality Assurance of Mass Produced and Released Fruit Flies (D4.10.16)

The first Research Co-ordination Meeting, to plan and co-ordinate the research, was held 1 - 5 November 1999 in the IAEA, Vienna, Austria. Proceedings of this meeting will be available from the Section or via our web site shortly.

The objective of the CRP is to improve and standardise international quality control procedures for mass produced fruit flies. There are now over ten fruit fly mass rearing facilities in the world that produce sterile flies for SIT programmes. With international trade in sterile insects becoming a reality, it is important that producers and users apply standard international quality control procedures. A CRP involving behaviourists, physiologists and mass rearing specialists will allow fine-tuning of the internationally accepted standards and procedures as well as developing new tests measuring more representative parameters. A Consultants Group Meeting on the International Standardization of Quality Control Procedures for Mass Reared and Released Fruit Flies was held in May 1997 in Vienna. It produced an updated international manual of standard QC procedures (available for downloading from the internet at http:// www.iaea.org/ programmes/ nafa/ d4/ public/ d4_pbl_5_1.html) and recommended implementing this CRP to address those technical issues that require fine-tuning and those that could not be resolved and therefore require a co-ordinated R&D approach to develop new or better QC tests.

The 2nd RCM will be held in Mendoza, Argentina from 5 – 9 November 2001.

Expected duration: 5 years (1999-04).

Contract Holders (12) from: Argentina (2), Chile, Costa Rica, Guatemala, Israel (2), Lebanon, Mexico (2), Peru, Philippines and Portugal.

Agreement Holders (4) from: Australia, France, Japan and the United States.

Evaluating the Use of Nuclear Techniques for the Colonisation and Production of Natural Enemies (D4.30.02)

The first Research Co-ordination Meeting, to plan and co-ordinate the research, was held 18 - 22 October 1999 in the IAEA, Vienna, Austria.

Nuclear techniques have considerable potential for various uses in biological control. These applications should provide significant benefits to producing biological control agents and for using them to manage pests, facilitate trade, and protect the environment. The First Co-ordination Meeting focused on developing a research plan for the following potential applications of nuclear techniques in biological control:

a) to provide a non-destructive means for pasteurization/ sterilization of artificial diets. Using ionizing radiation to destroy micro-organisms in artificial media provides a viable method to sterilize media without the damaging effects associated with heat treatment, and allows sterilization to be accomplished after diet dispensing and packaging ("terminal sterilization").

b) to provide non-reproductive supplemental hosts/prey for parasitoids and predator to build-up naturally occurring or augmentatively released natural enemies early in the season when pest populations are low. Non-parasitized hosts would be sterile, even further contributing to suppress the pest population.

c) to provide sterile pests/hosts as food during commercial shipment of entomophagous insects/mites, thereby assuring quality during transport and that no new pest or pest race is introduced into the regions or countries of customers. Irradiation would also help to fulfil quarantine regulations by avoiding the transport of other hitchhiking pests.

d) to improve the suitability of natural or factitious hosts/prey for use in parasitoid/predator mass rearing, by helping for example to overcome host resistance such as encapsulation of parasitoids. Radiation of hosts during mass rearing would also avoid the emergence of fertile adults of the pest, or the need for costly procedures to separate parasitized from non-parasitized insects.

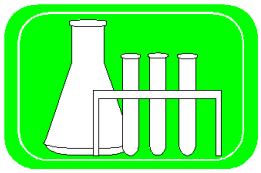
e) to reproductively sterilize exotic beneficial insects that are promising candidates for classical biological control, thus enabling safe field testing of their host or prey specificity on weeds or insect pests. In view that there are many reported cases of natural enemies becoming pests, and the fact that promising natural enemies are eventually not released because doubts persist as to their specificity after detailed assessments under quarantine conditions, safe field testing of specificity is a major use of ionizing radiation not exploited to date.

The 2nd RCM is scheduled to be held in Tapachula, Mexico 18-22 June 2001.

Expected duration: 5 years (1999 - 04).

Contract Holders (13) from: Argentina, Bangladesh, Bulgaria, China, India, Indonesia, Mexico, Pakistan, Poland, Slovak Republic, Syria and Turkey (2).

Agreement Holders (4) from: Austria (2) and the United States (2).



G. DEVELOPMENTS AT THE ENTOMOLOGY UNIT SEIBERSDORF

1. Testse R and D

Evaluation of a New Rearing System

Evaluation of Tsetse Production Unit 3 (TPU 3) was completed using a *G. pallidipes* strain from Uganda. The design and structural characteristics of the system are very satisfactory. The distribution of flies within the cages was random leading to good survival as the flies were not crowded. When compared to the standard trolley, survival and productivity of the two groups of flies were not significantly different. The QC data of pupae produced by flies from TPU 3 were similar to those by the trolley flies. TPU 3 can be used to maintain a self-sustaining colony of tsetse and will form the basis for future large-scale colony development. Observations of the effect of light on fly distribution (using plexiglass shelves on TPU 3) have lead to the modification of the pupal collector on TPU 2. Results of tests to date show a significant improvement in performance of flies on TPU 2 since the introduction of the plexiglass shelf.

Mating compatibility tests

For the implementation of SIT in the field it is important to assess the mating compatibility of different populations of the same species. If populations from different regions are compatible then a single strain can be developed and used for release. A first step to assess this is the use of a field cage test. *G. pallidipes* strains from Uganda and Ethiopia were evaluated in the field cage. No barrier to mating was observed between males of the Uganda strain and females of the Ethiopian strain. The presence of salivary gland hyperplasia in males of the Ethiopian strain interfered with their ability to mate and further studies on this will be carried out.

An areawide programme, using aerial spraying followed by the release of sterile males is being initiated for the eradication of *G. morsitans centralis* in the Okavango Delta, Botswana. A large colony of the same species from Tanzania is already available. In field cage tests no mating incompatibility was shown between these two populations suggesting that, if necessary, the Tanzanian strain could be used in Botswana.

These are preliminary mating compatibility data and need to be confirmed by further tests in the field.

Hybrid Sterility

A series of experiments on hybrid sterility has been concluded. The data showed that certain hybrid crosses resulted in full sterilization of the female for her complete lifespan. This suggests that males of a particular species could be released into the field to control a second species. Initial experiments were also carried out on mating choice and remating of females. In the tested combinations mating was random but the chance of remating was dependent on which type of male the female first mated with. In multiple mated females, sperm utilization was not random and sperm displacement or choice was clearly shown. Sperm use was monitored using DNA analysis. A PhD thesis on this

subject, by Pamela Olet, will be submitted to the University on Vienna in June.

Other activities include evaluation of pig blood as a sole dietary source, lifetable analysis of two *G. pallidipes* populations and storage of male pupae and adults at low temperatures.

2. Medfly R and D

Genetic Sexing Strain (GSS) with an Inversion

A new VIENNA 7 strain was constructed based on the inversion D53 (*wp tsl)*. The inversion includes *wp* but not the *tsl* locus. To increase the genetic variability, the homozygous inversion strain was outcrossed in parallel with material from Chile, Australia, Peru, South Africa and Tunisia. Males from the wild type strains were crossed with D53 females followed by a mass inbreeding of the F1. The F2 generation was set up in single pair crosses and the F3 was tested for temperature sensitivity. Temperature sensitive families from all parallel crosses were combined. The final strain was generated by two backcrosses between males from the translocation strain T(Y;5)3-129 and females from the pooled material. After re-testing the temperature sensitivity the strain was transferred to the Seibersdorf mass rearing facility for further analysis. The new strain is called VIENNA $7i_1$/Mix-2001 where the suffix "i_1" denotes the presence of the inversion D53.

To evaluate the effect of the inversion on recombination level, two strains were reared under stress rearing conditions as this is known to favour breakdown in GSS. One strain, C-30-1, was used as control as it carried the normal chromosome and C-30-2 carried the inversion. The % of recombinants was monitoring for 3 generations. In C-30-1, the percentage of recombinants increased from 2% at the first generation to 20 % at the third generation. However in C-30-2 that carried inversion D53 no recombinants were observed. The results confirmed expectations that inversion D53 can be used to improve stability of GSS.

Genetic Marker in Genetic Sexing Strains (GSS)

The outcrossing was done with D53 females to preserve the adaptation to lay eggs through nets and to allow the incorporation of an internal molecular marker based on the maternally inherited mtDNA. To simplify the detection of this marker, two sets of PCR primers were developed. Both sets flank a HaeIII restriction site that is found only in strains based on the wild type strain EgII. The primers were also analyzed with respect to their ability to give defined fragments with DNA isolated from dead flies. The results show that the primer set that amplifies a relatively short mtDNA fragment and can be used to analyze flies that were dead for ca 14 days. Labeling GSS with an internal marker is very important for several reasons: to determine whether the GSS was contaminated, to determine whether GSS flies were introduced into the target population and to identify GSS flies in trapped material.

Shipment of Medfly Eggs and Pupae

In order to support the medfly SIT programme in the Western Cape, South Africa, shipments of sterile male-only pupae and fertile eggs have been sent on a regular basis to the Stellenbosch rearing facility. One million sterile male pupae and 10 million eggs/week, from VIENNA 7/ Mix-2000 GSS, have been sent to the programme. The emerging males are directly released whilst the eggs are first incubated at 34ºC to kill females;

the males are then reared, sterilised and released. The small pilot facility in South Africa produces three million of sterile males/week and the required 5 million males can now be released every week. Results from field operations are very encouraging and have resulted in reduced insecticide use and reduced rejection due to fruit flies of export shipments.

Eggs of the VIENNA 7/Mix-2000 GSS were shipped to the medfly rearing facility in Madeira, Portugal to replace their old colony that was heavily contaminated due to uncontrolled breakdown. The Madeira facility has used the eggs to produce fertile adult to replace the colony at the filter level. The Filter Rearing System (FRS) has been set up and is working continually. The installation of FRS will allows the Madeira facility to produce 30 millions male pupae per week with 99.0 % accuracy.

Use of Sergeant Sr^2 as a Marker

A cost-free intern Nuri Niyazi from Imperial College London has been conducting research to assess the rearing performance and QC profile of a GSS that is marked with this mutation. Sr^2 is a dominant mutation that induces a third white strip on the abdomen of males in a GSS. Initial field cage tests with the mutation itself have shown no major disadvantages associated with the mutation. If the production profile and QC data are satisfactory then competitiveness and compatibility field cage studies will be conducted comparing the marked strain with the unmarked GSS, VIENNA 7/Mix GSS and fertile wild flies. A GSS marked with Sr^2 could replace the use of fluorescent powder for marking released flies.

Other activities include mapping of important mutations on chromosome 5, analysis of transgenic strains, induction of strains marked with green fluorescent protein, use of starter diets and establishment of a colony of *Bactrocera oleae*.

H. SPECIAL NEWS AND REPORTS

Annual Prize Award

The Head of the FAO Agriculture Department, Assistant Director-General Louise O. Fresco, awarded an Annual prize for the best publication in the AG Department. In its category the paper "Genetic sexing strains in the medfly, *Ceratitis capitata*: Development, mass rearing and field application" (Trends in Entomology (1999) 2, 81-104) by A.S. Robinson, G. Franz and K. Fisher received the first prize. This review describes the construction of genetic sexing strains, their evaluation during rearing and in field/field cage tests and it summarizes the application of such strains in many operational SIT programmes including Australia and the USA. The prize was awarded by Louise O. Fresco during her visit to the FAO/IAEA Agriculture and Biotechnology Laboratory in Seibersdorf in January 2001. .

Status of the sterile Medfly Preventive Release Program (PRP) in Los Angeles Basin, California

This is an update on changes being made to the Mediterranean Fruit Fly (Medfly) Preventive Release Program (PRP) that has been going on successfully since 1996 in the Los Angeles Basin.

The PRP, based on the daily release of sterile male medflies, has been in existence for more than four years, and has proven to be extremely successful in keeping the Medfly from becoming established in the Los Angeles Basin. Prior to the inception of the PRP, California had suffered major Medfly infestations in the Los Angeles Basin every year since 1987. Between 1987 and 1994 an average of 7.5 Medfly infestations were discovered each year. Since the inception of the programme, this has dropped to 0.2 infestations per year (97% reduction). In 2000 there was no infestation. The PRP has reduced eradication costs, eliminated the need for aerial spraying and most importantly, restored the confidence of USA trading partners.

To keep abreast of changing technologies and to maintain the highest levels of biological effectiveness, the Department of Food and Agriculture (CDFA) and the United States Department of Agriculture (USDA) are transitioning the PRP into all male release program using the Temperature Sensitive Lethal (TSL) strain of sterile Medflies provided by the Joint FAO/IAEA Programme. The transition to an all male release is in concurrence with the recommendations made, and accepted by CDFA and the USDA, by the Medfly Science Advisory Panel (MedSAP). The changeover is also consistent with the long-term goals of the USDA and CDFA production facilities in Hawaii that are being remodeled and converted to TSL production.

The CDFA facility in Hawaii should be ready for start up with the TSL strain in the summer of 2001. The anticipated date for the CDFA facility to reach full production level is the winter of 2001. Following the return of full production in the CDFA facility, the USDA Hawaii facility is planning to remodel and convert to the TSL strain. Once the USDA Hawaii facility begins the conversion process, the PRP will complete the transition to TSL sterile males. Information provided by: Pat Minyard, Branch Chief, Pest Detection/Emergency Projects, Plant Health and Pest Prevention Services of CDFA.

Review of Moscamed Guatemala/Mexico, February 2001

This successful SIT programme, resulting from various IAEA TC projects implemented since the late 1970's in Mexico and Guatemala, has been a model for many other fruit fly SIT projects in other parts of the world. It has effectively maintained a sterile fly barrier to keep Mexico, the US and half of Guatemala free of medfly, thereby protecting a multi-billion dollar fruit and vegetable export industry. The US, Mexico and Guatemala fund the programme. The terms of reference of the review team (RT) covered both managerial and technical aspects of current activities and future activities related to the development of a regional approach the problem of medfly in Central America.

A major concern of the RT was related to the funding base of such a SIT barrier programme. At present the majority of funds are from emergency sources that are unpredictable in amount and uncertain in duration, this prevents the programme from developing a strategic plan in the context of a regional approach. The RT addressed this matter in the recommendations.

The future activities at the Moscamed facility in Tapachula, Mexico were also discussed. Currently, the plant produces 500 million sterile flies/week of a bisexual strain for release in Chiapas. If the sterile medfly barrier indeed moves south then other options are open for the facility. The RT recommended that the facility introduce male only production by obtaining eggs from the genetic sexing colony in El Pino and that at a later date the facility initiates *Anastrepha* rearing.

The El Pino facility in Guatemala is expanding its production of sterile males to 1.6 billion/week by the end of the year and hopes to produce 2 billion/week in the future. However, this will not be sufficient when the regional programme is fully implemented. The establishment of additional rearing facilities in other Central American countries is being recommended.

The future success of the programme will depend to a large extent on public acceptance and public information campaigns have been given a high priority. This will become much more important when the programme moves to new operational areas. In addition, the problems caused by *Anastrepha* fruit flies will need to be addressed and the Peten and other future low-prevalence areas will need to obtain certification to export their agricultural products (see TC project RLA/5/045).

Technical Advisory Committee for OIRSA/Mitch Projects in Central America

Countries in Central America are currently reviewing the possibility of establishing fruit fly free zones or low prevalence zones to meet World Trade Organization's Sanitary and Phytosanitary Standard (SPS) requirements. To accomplish this goal, meeting the International Standard on "***Requirements for Pest Free Zones***" will be required. In support of this process OIRSA is implementing projects with funding from the US Department of Agriculture, Foreign Agriculture Service through the Hurricane Mitch Recovery Programme to create medfly-free zones in Honduras and Nicaragua. Both countries have initiated activities in carefully selected and defined areas to comply with national and international standards mentioned above concerning medfly free areas or zones. To assure acceptance of host fruit and vegetables from free zones by importing countries, Honduras and Nicaragua must not only establish free zones, but also have a capable administrative, technical, and regulatory infrastructure in place to assure continued freedom from infestation.

The USDA, Foreign Agriculture Service, under the Hurricane Mitch Recovery

Programme, has requested that IICA establish a Technical Advisory Committee (TAC) to provide a broad base of technical expertise for the medfly-free zone projects, to create a forum for harvesting the lessons learned from the USDA-OIRSA project, and to establish a platform for technical assistance to governments within the region for related activities after completion of the current project. This committee is collaborating closely with OIRSA who is responsible for the current projects being conducted in Honduras and Nicaragua.

Members of the Committee included: Mr. Ed Ayers (IICA), Mr.Gordon Tween (USDA/MOSCAMED), Mr.Aldo Malavasi (University of Sao Paulo), Mr. George Berg (OIRSA) and Mr. Walther Enkerlin, (Joint FAO/IAEA Division). Mr. Juan Jose May, Director of Plant Protection for OIRSA, joined the group to assist in coordinating the visits to the countries.

The TAC was convened for the first visit from 18 to 24 April, meeting with OIRSA officials in San Salvador on 18 April to discuss the purpose of the TAC; to introduce the members of the TAC and to agree on parameters for the review. The TAC reviewed the programme operations in Nicaragua on 19 and 20 April and in Honduras on 23 and 24 April 2001.

A comprehensive report of the project review for Honduras and Nicaragua was prepared. The report discusses the general project strategy and techniques being applied and presents clear recommendations to improve the general project management and the application of the different techniques. The recommendations where explained to the project staff through field demonstrations and technical meetings. Agreement was reached that recommendations on technical aspects were to be implemented immediately. Implementation of aspects related to general project strategy and management will have to wait until the final report is presented to the OIRSA senior authorities, who will have to decide on the time frame for implementing agreements.

The most relevant agreements include**:**

1) Concentrate resources in smaller areas where there is indication that medfly does not occur or occurs in small numbers in both countries, Honduras and Nicaragua.

2) Approach the fruit fly problem in Honduras and Nicaragua as a whole including not only medfly, but also the *Anastrepha* species of economic importance, as a pre-requisite to the possibility of exporting fruit to fruit fly free markets.

3) Evaluate the feasibility of exporting from fruit fly low prevalence areas, fruits considered to be fruit fly marginal host such as pitahaya and rambutan.

4) Improve the trapping and fruit sampling general operation including the use of female attractant against medfly and McPhail traps against the *Anastrepha* complex, at recommended rates.

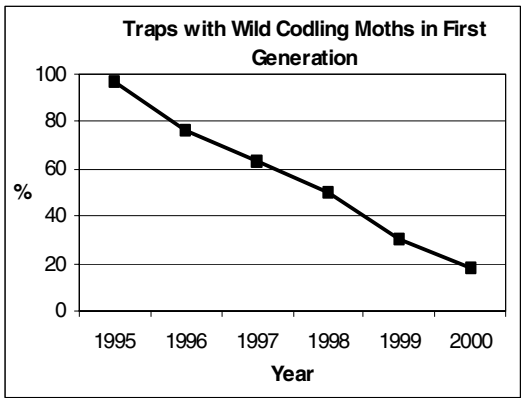
5) Develop the quarantine infrastructure until sufficient reliable data on the medfly population is available. If the selected areas are determined to be medfly free the quarantine infrastructure should be established immediately to protect the selected areas from medfly introductions.

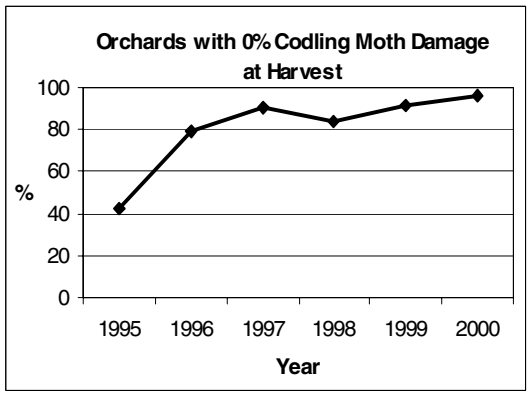
Independent review of area-wide fruit fly projects having a SIT component through a Technical Advisory Committee (TAC) of external specialists, proved once more to be a valuable mechanism to improve general programme operations by adopting the recommendations provided by TAC.

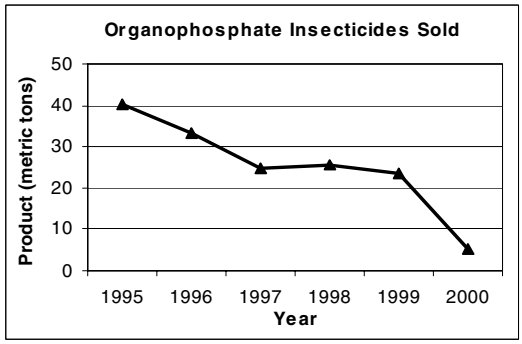
Codling Moth Suppression in Apple and Pear Orchards, Zone 1, Okanagan-Kootenay Sterile Insect Release (SIR) Programme, British Columbia, Canada

Excellent codling moth suppression and fruit damage reduction have been achieved in this SIT suppression programme by applying several management tactics including the release of sterile moths. As a result the use of organophosphate insecticides has declined drastically to a low level in this apple producing region of British Columbia.

The sources of the data are acknowledged with thanks. Data on codling moth trap catches and orchard fruit damage were provided by the Okanagan-Kootenay Sterile Insect Release Board (http://www.oksir.org), and data on insecticide sales were provided by the British Columbia Ministry of Environment, Lands and Parks.







The International Conference on Control of Old World Screw-worm Fly in Some Countries of The Middle East.

The Arab Organization for Agricultural Development (AOAD) convened an International Conference on the Control of Old World Screwworm fly (OWS), *Chrysomya bezziana*, and other myiasis causing flies in Manama, Bahrain during the period 9-12 April, 2001. Participants included international experts and representatives from FAO, IAEA and other international organizations and researchers from USA, Australia, UK, Malaysia, Mexico and Arabian Countries.

Twelve thematic papers were presented including the results of the AOAD project phase I lunched in some of the Middle East countries to control and prevent further spread of the OWS. Phase I of the project includes a training programme that covers national, regional and international courses, intensive surveillance, quarantine, animal treatments and public information activities and research projects. Building upon phase I the participants recommended to prepare the grounds for a Phase II that would basically consist of scaling up the field operations in the Middle East against the OWS including

quarantine measures, surveillance of OWS fly and control and eventual eradication. Under this last point, the most relevant actions would be: 1) to strengthen the OWS rearing efforts in Iraq, 2) coordination and cooperation between AOAD, FAO, the IAEA and other relevant partners to prepare the project document for Phase II and 3) support in training and research activities including molecular genetics, screening insecticides, methods of risk evaluation, development of extension services, etc.

Gainesville Course

The Interregional Training Course on The Use of The Sterile Insect and Related Techniques for the Integrated Area-Wide Management Of Insect Pests took place in Gainesville, Florida, from 11 April to 17 May, 2001.Twenty four students from 23 countries participated in the course. For both plant and animal insect pests, lectures covered most aspects of the area-wide integrated pest management with particular emphasis on the Sterile Insect Technique and other related monitoring and control methods. Lectures included: the area-wide concept, theory and practice on economic aspects of the SIT, principles and fundaments of the SIT and related techniques, case studies of past and ongoing SIT control programmes, the International Plant Protection Convention (IPPC) role in supporting countries developing and implementing international phytosanitary regulations for fruit exports and future trends on SIT related basic and applied research.

The Gainesville course is much more than the effort of transferring knowledge on the area-wide use of the SIT and related techniques. The interaction among people of diverse nationalities but with similar problems and interests provides the opportunity to foster the spirit of an international SIT family by being together and jointly discussing and developing ideas. The case studies developed by the participants at the end of the course showed the interest and commitment for SIT and highlighted various opportunities for future interaction on research and technical cooperation.

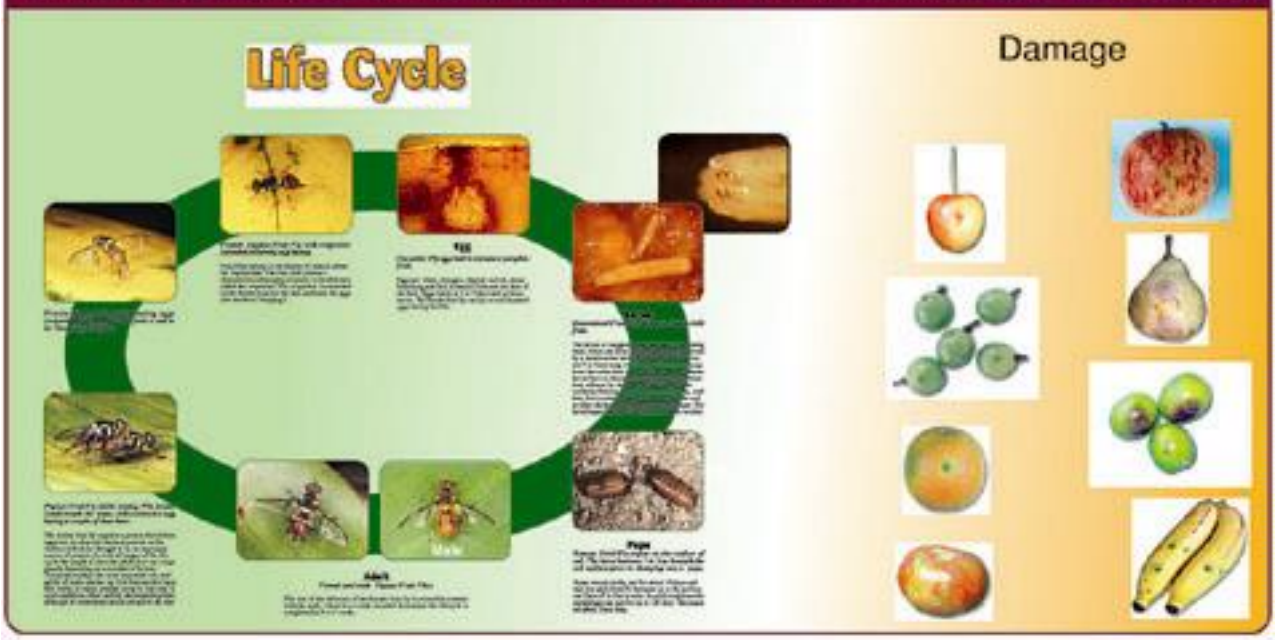
The Gainesville Course should continue to be a very valuable means of creating SIT related networks by bringing together people working in the same areas with common interests. Expansion and enlargement of the SIT network will be fostered by including participants at the Gainesville Course in the Newsletter mailing list and by keeping our communication lines opened to any participant with interest to continue working in the field of the SIT.

Poster: Fruit Fly Pests of the World

A project to produce large color posters illustrating the life cycle of major fruit fly pests of economic importance and the damage they cause as well as featuring photographs of 64 major species of fruit fly pests from around the world is nearing completion. A small Australian company, Scientific Advisory Services Pty Ltd has been working on the project for the past 5 years sourcing high quality photographs of adult flies for use on the posters. The photographs are mostly of live adults. For each species illustrated there will also be information on the major commercial hosts, lures and world distribution. With funding provided by the Joint FAO/IAEA Division the posters will soon be produced and should provide a valuable information tool to create awareness among travellers of the potential risk of moving fruit fly pests in fresh fruits and for assisting quarantine agencies in their efforts to prevent introductions of exotic fruit flies to pest free areas. The poster presented is a draft sample of the original product.

FRUIT FLY PESTS OF THE WORLD

Fruit flies are the world's most important quarantine pests of horticulture.
They attack a wide range of crops and affect the trade of these commodities between regions.



The hosts

Second Meeting of the National Project Counterparts for the Fruit Fly SIT Projects in the Middle East.

The meeting of the National Project Counterparts for the Fruit Fly SIT projects in the Middle East was held successfully in Vienna on March 26-28th, 2001. The meeting was attended by the counterparts and participants from Egypt, Israel, the Hashemite Kingdom of Jordan, the Territories Under the Jurisdiction of the Palestinian Authority (TC projects EGY/5/025, ISR/5/010, JOR/5/009, and PAL/5/002), mission representatives, and members of US governmental agencies.

Following the recent award of a USAID grant of $2.5 million for the period 2001-2003, the workplans of the TC projects for the coming twelve months were prepared and agreed with the contribution and inputs of all the participants.

The recent approval of TC project EGY/5/025 "Areawide fruit fly control in Eastern Egypt" in connection with the identification in Egypt of the peach fruit fly, *Bactrocera zonata*, a serious threat for the agriculture in the region (see previous issues of the Newsletter), resulted in a strong will to consider the fruit fly problem from a regional perspective. Training, data management and reporting will be shared among the counterparts of the four fruit fly TC projects in the region. As an emergency action, Israel, the Hashemite Kingdom of Jordan, and the Territories Under the Jurisdiction of the Palestinian Authority will set-up or strengthen a detection trapping network to assess the presence/absence of this new pest in the region and will be ready to take action in case of a positive detection. In Egypt, Male Annihilation Technique (MAT) operations have been initiated in Northern Sinai as from May 2001. After the Arava/Aqaba valley, SIT operations against medfly will, in the coming twelve months, be extended to Western Negev in Israel, and Jordan valley in Jordan, while SIT preliminary field operations will be initiated in the Gaza Strip and the West Bank.

The next meeting of national project counterparts is foreseen to be held in Stellenbosch South Africa in May 2002.

I. ANNOUNCEMENTS (staff changes and other)

Jean-Pierre Cayol joins the Section

Jean Pierre Cayol joined the section as a fruit fly expert in March 2001. He had previously worked in the Entomology Unit of the Joint FAO/IAEA Agriculture and Biotechnology Laboratory, IAEA Laboratories Seibersdorf, as an Associated Professional Officer working among other subjects in developing standard quality control methods for fruit fly behaviour. In 1999, he served as the Technical Coordinator of the National Carambola Fruit Fly Eradication Programme in French Guiana, where he gained ample experience in area-wide fruit fly field operation activities. Jean Pierre has published at least 14 papers in international journals of entomology. He holds a Ph.D in Zoology from the Faculty of Science and Technology of St Jerome, University of Marseille, France.

Marta De Coronado joins the Section

Marta De Coronado joined the Section as Senior Secretary in April. Previously she worked for the Technical Co-operation Department (ARCAL Programme) and Department of Nuclear Safety (Asset Missions). Before joining the IAEA, (1992) she worked for the private sector in Guatemala.

Course on Dosimetry for SIT

A course on dosimetry for fruit fly sterilization will be held on November 24, 2001, a day before the beginning of the IV Meeting of the Working Group On Fruit Flies of the Western Hemisphere. There will also be the opportunity for non-participants of the CRP on Quality Assurance of Mass Produced and Released Fruit Flies to attend the course. Those interested in participation need to contact the local organiser Ing. Oscar de Longo, iscamen@cpsarg.com or the Group Chairman Dr. Pedro Rendon, prendon@guate.net.

CD-ROM On Screwworm

The National Agricultural Library (USDA/ARS) has published a CD-ROM called "Stop Screwworms: Selections from the Screwworm Eradication Collection". The address is: http://www.ars.usda.gov/is/pr/2001/010131.htm

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