



# Insect and Pest Control Newsletter



JOINT FAO/IAEA DIVISION OF NUCLEAR TECHNIQUES IN FOOD AND AGRICULTURE  
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André Van der Vloedt: 1940 - 1991

The news of the death of Dr. André Van der Vloedt has, by now, reached most of our readers through personal letters and other correspondence sent out from Vienna during January and February this year. The sad event occurred on Tuesday, 31 December 1991, at a hospital in Vienna. André had been taken ill early in December, during duty travel to discuss tsetse field projects in Tanzania/Zanzibar and Zambia. He was buried in his hometown, the city of Ghent in Belgium.

On Thursday, 16 January 1992, a memorial service was held for him in the Little (Russian) Church near the Vienna International Centre. Several tributes were paid to his memory on that occasion, and his family has since received letters of condolence, personal visits and telephone calls from André's numerous friends all over the world.

Nowhere was his death felt more painfully than in Africa. As technical officer responsible for tsetse research and field projects in some 12 African countries and a consulting researcher and advisor on tsetse and trypanosomiasis control in many others, André travelled widely in Sub-Saharan Africa during the 17 years that he served with the International Atomic Energy Agency, and saw the tsetse fly and its scourge on the African continent first-hand. A recent letter from a Kenyan colleague summed up the sentiments of all African tsetse scientists who knew him. He wrote:

I have known him as an excellent trainer and entomologist. His charming sense of humour, forthright expression, articulate scientific knowledge and purposeful contribution to tsetse control in Africa will linger for a long time in the memory of those who worked with him.

In the Eulogy delivered at the memorial service by Dr. Lindquist, André was likened to "a Belgian beer in an Austrian mug" and "a European in a World coat". Yes, he was these and more.

As a first class scientist, he was an untiring researcher; he published numerous papers on many aspects of tsetse biology, ecology and control. As a good manager, he was an organiser par excellence; the tsetse team in the Agency's Laboratory in Seibersdorf would testify to the esprit de corps that prevailed in the tsetse Unit when André was in charge. As a teacher, André was unsurpassed; ask the trainees and junior professionals at Seibersdorf, and ask the participants - trainees and lecturers alike - of the numerous FAO/IAEA seminars and training courses; ask his friends and colleagues anywhere in the world. A good teacher is a good story-teller - so was André.

The contribution of André Van der Vloedt to the programme of the Insect and Pest Control Section and the tsetse programme of the Joint FAO/IAEA Division will be sorely missed, but as Dr. Sigurbjörnsson has aptly put it, the memory and legend he leaves behind will live on, and should inspire all of us to carry on fighting for the good cause to which he devoted his 17 years of service.

His dedication and enthusiasm, his sacrifice and humour, so admirably displayed till the very end of his life, should serve as a guide for all his colleagues striving to alleviate hunger and misery in the less developed parts of the world.

May his soul rest in eternal peace.

# I. GENERAL INFORMATION

## The Staff

The Section's staff, consisting of those in the Joint FAO/IAEA Division located in the Vienna International Centre and those in the IAEA's Seibersdorf Laboratory, are listed below with their nationality and the year they joined the Agency.

### Name

### Duties

#### JOINT FAO/IAEA DIVISION

B. Sigurbjörnsson, Director  
L.E. LaChance, Deputy Director (Retired 31 March 1992)

#### Insect & Pest Control Section's Office

D.A. Lindquist (USA) 1980	Section Head
W. Klassen (USA) 1990	Acting Head
J. Chirico (Sweden) 1992	SIDA-funded Screwworm Investigator
E.D. Offori (Ghana) 1992	Acting Technical Officer (Tsetse)

L. Kruzic (Australia) 1983	Secretary
M. Hallqvist (Sweden) 1989	Secretary

#### Entomology Unit, Seibersdorf Laboratory

R.E. Gingrich (USA) 1980	Unit Head (Microbiology)
U. Feldmann (Germany) 1988	Tsetse Programme Leader (mass-rearing)
J. Hendrichs (Mexico) 1991	Medfly Programme Leader (mass-rearing)
G. Franz (Germany) 1989	Medfly genetic sexing and molecular biology

D.A. Lindquist transferred to Libya in August 1990 to become Director of the FAO-led field programme for the eradication of the New World screwworm (SECNA/FP). He is expected back in Vienna early July 1992.

W. Klassen has been Acting Head of the Section in the absence of Dr. Lindquist. Following the retirement of Dr. LaChance, Dr. Klassen will become the Deputy Director, Joint FAO/IAEA Division.

E.D. Offori, former member of staff of the Joint FAO/IAEA Division (Insect and Pest Control Section), came from retirement to assist the Section for a while, following the death of Dr. André Van der Vloedt.

M. Vreysen (Belgium), former FAO Associate Professional Officer, was recruited in 1991 as an expert and stationed on Zanzibar where he is leading a team participating in efforts to eradicate the tsetse fly Glossina austeni.

P. Kerremans (Belgium), former FAO Associate Professional Officer (medfly genetics and molecular biology) terminated on 31 March 1992 and has since returned to Belgium.

## II. THE SECTION'S PROGRAMME

### A. Co-ordinated Research Programmes

The following four Co-ordinated Research Programmes are currently in progress:

#### 1. Development of Practices for Area-wide Tsetse Eradication or Control, with Emphasis on the Sterile Insect Technique

Objective: To develop, refine and recommend application of methodologies for applying the SIT to eradicate tsetse flies from critical areas of Africa, in order to control animal trypanosomiasis.

Expected duration: 5 years (1989 - 1993)

Contract holders: (8) from Ethiopia, Ghana, Kenya, Nigeria, Italy, Uganda, UK.

Agreement holders: (4) from Canada, Czechoslovakia, Belgium, USA.

#### 2. Laboratory and Field Evaluation of Genetically Altered Medflies for Use in Sterile Insect Technique Programmes

Objective: To refine procedures for selecting conditional lethal mechanisms, characterise the mode of inheritance and work out techniques for translocating the dominant allele to the male-determining chromosome.

Expected duration: 5 years (1989 - 1993)

Contract holders: (8) from Israel, Brazil, UK, Greece, Argentina, Italy, Kenya, Spain.

Agreement holders: (3) from Greece, USA.

#### 3. Genetic Engineering Technology for the Improvement of the Sterile Insect Technique

Objective: To develop and apply genetic engineering techniques to improve SIT operations (emphasizing technology that could readily be transferred to developing countries to be incorporated into pest control programmes).

Expected duration: 5 years (1988 - 1993)

Contract holders: (none)

Agreement holders: (7) from Australia, Greece, Italy, Japan, UK, USA.

### B. Technical Co-operation Programmes

Technical Co-operation Programmes for which this Section has technical responsibility fall under three major problem areas, namely:

1. The tsetse fly.
2. The New World screwworm.
3. The Mediterranean fruit fly.



Thirteen projects are currently operational under these programmes. A brief review is presented in this issue of the on-going tsetse projects. Others will be presented in later issues.

CHA/5/017: Eradication of the Riverine Tsetse Fly Using the Sterile Insect Technique

The two target species involved in this project are *Glossina palpalis gambiensis* and *G. tachinoides*. Two laboratories (Achimota and Kwabenya) are rearing the flies using Guinea-pigs as host animals. Field activities (survey and mark-release-recapture studies) are conducted in Northern Ghana by the Department of Animal Health and Production, Ministry of Agriculture, Pong-Tamale.

A one-month assignment was recently undertaken by an IAEA expert to review laboratory and field activities. The expert identified several steps to be taken by the laboratories to remedy inadequacies in rearing procedure. The location of field activities was recently changed from the north-west (Wa city area) to an Onchocerciasis-free zone.

It is anticipated that the tsetse laboratory in Bobo-Dioulasso will assist the project by providing additional flies during the SIT-operational phase.

MLI/5/012: Lutte contre la trypanosomiose animale dans la zone agropastorale de Tienfala-Banguineda

The original purpose of this project was to investigate integrated control/eradication (including the SIT) of riverine tsetse, notably *G. p. gambiensis*, in the target area. Such an undertaking would require detailed baseline information on the project area, which was lacking at the time the request for assistance was made.

A three-week mission by an IAEA expert in August/September 1991 enabled the counterpart institute to identify the northern sector of the project area as the most suitable for a future SIT-based control/eradication programme. Field studies, including parasitological investigations are currently in progress.

NIR/5/021: Preventing Tsetse Fly Re-invasion - Phase II

The successful eradication of *G. palpalis palpalis* from a 1500 km<sup>2</sup> area during the first phase of BICOT (1979 - 1987) was followed by a bridging operation in 1988/90 and then in 1991/92 to remove *G. tachinoides* which served as control during the first phase of BICOT. Mass-rearing of the target species (*G. p. palpalis*) was undertaken in Vom, Nigeria. Backstopping activities in Seibersdorf included production and shipment of additional puparia to augment those produced in Vom.

The project is currently being funded with an extra-budgetary contribution by the Government of the UK.

An expert visiting the project in 1991 assisted in identifying some of the major problems plaguing operations, such as increased fly mortality and reduced effectiveness of locally produced traps and screens. A major constraint appears to be inadequate funds from local sources. Problems relating to the clearing of goods from customs appear to have been resolved.

UGA/5/012: Integrated Tsetse Control Programme

The objective was to carry out studies relating to the use of the sterile insect technique as part of an integrated programme aimed at eradicating economically important species of tsetse in critical areas of Uganda. Buvuma island was selected for field operations and G. f. fuscipes as the target species.

Rearing of G. f. fuscipes and other tsetse species is in progress at the Uganda Trypanosomiasis Research Organisation (UTRO) laboratories in Tororo. Through a related research contract, investigations are proceeding to determine the distribution of tsetse species on Buvuma island. An IAEA expert recently assisted operations by testing the effectiveness of biconical (baited and unbaited) traps in catching G. f. fuscipes on Buvuma island.

URT/5/007: Tsetse Fly Eradication (Zanzibar) (see p. 14)

Only one species, G. austeni, is known to occur on Zanzibar island. The objective of the project has been to eradicate this species, using an integrated approach including the SIT. Following successful rearing of the target species, the plan of operations envisaged field activities including testing of various trapping devices for their efficiency in lowering the natural population prior to release of sterile males.

An IAEA expert in charge of the project in Zanzibar is currently testing three types of traps, Monopanel (MP), 2 leg-panel (LP) and 3 dimensional (3D) at selected locations. Sticky glue is applied to the panels which are left for a pre-determined period of time before examination. The possible use of sterile females as an additional monitoring method is being tested.

Mass-rearing of G. austeni has progressed satisfactorily at the Tanga Tsetse and Trypanosomiasis Research Institute. The colony contains over 45,000 females which are fed in vitro using fresh bovine blood and a silicone membrane.

ZAM/5/009: Tsetse Fly Control

The project aimed to set up a tsetse rearing laboratory in support of a planned programme to use the SIT as part of an integrated programme to eradicate G. morsitans centralis in selected areas of Zambia where livestock is at risk from animal trypanosomiasis. After several attempts to establish a thriving colony, the project is currently under review by the National Council for Scientific Research (NCSR). A revised plan of operation will be drawn up shortly by the counterpart and measures introduced to improve fly colony maintenance and mass-rearing.

Other Operational Projects

- LIB/5/007: Eradication of the Screwworm in Libya (see p. 14) (1989)
- CHI/5/015: Mediterranean Fruit Fly Eradication (commenced 1991)
- COS/5/012: Medfly Research Laboratory (1991)
- ECU/5/013: Control of the Fruit Fly (1989)
- RAF/5/013: Survey of the Extent of Medfly Infestation in North Africa (1988)
- THA/5/038: Integrated Control of Fruit Flies (1991)
- PAK/5/018: Sterile Insect Technique (1983)

### III. MEETINGS

#### A. Past

1. Final FAO/IAEA Research Co-ordination Meeting on "Radiation Induced F<sup>1</sup> Sterility in Lepidoptera for Area-wide Control", Phoenix, Arizona, USA, 9 - 13 September 1991

Eleven research contract and agreement holders from 9 countries attended the RCM which was hosted by Dr. T.J. Henneberry, USDA-ARS Pacific West Area, Western Cotton Research Laboratory in Phoenix, Arizona. The research contract and agreement holders presented detailed reports of their research work dealing with the potential for controlling various species of Lepidopteran insects with F<sup>1</sup> sterility. The highlights of the meeting were the discussions and demonstrations of computer simulations of theoretical trends of insect populations given varying degrees of suppression exerted by the release of irradiated Lepidopteran insects presented by Drs. Carpenter and Anisimov. In addition, one of the local scientists at the Western Cotton Research Laboratory, Dr. Bartlett, presented an overview of his work on sterility, genetics and rearing of the pink bollworm.

Two sessions were devoted to discussions concerning future CRPs in the area of F<sup>1</sup> sterility principle for the control of Lepidopterous insects. Much of the discussion centered upon whether a future Co-ordinated Research Programme should attempt to focus on a single insect species or whether a variety of Lepidopteran species could be included.

It was agreed that a considerable amount of basic information is now available concerning the mechanisms and expression of F<sup>1</sup> sterility in Lepidopteran species.

It was also agreed that future needs are not in the area of radiation studies with a number of additional species. What is primarily needed are studies on the reproductive behaviour, and reproductive biology and also on techniques to be used to evaluate field programmes or small-scale field tests using F<sup>1</sup> sterility. There was general agreement that a future Co-ordinated Research Programme (CRP) should focus on F<sup>1</sup> sterility in Lepidopteran species since this insect order contains the most important crop pests in the world. The participants indicated that they would recommend that the programme include a variety of pests because various countries have different crop pests which are of major importance.

It was agreed that the title of the next Co-ordinated Research Programme should be: "Evaluation of Population Suppression Potential by Irradiated Lepidoptera and their Progeny", and that the areas which should receive major emphasis would be the reproductive behaviour, reproductive biology, field population trends, methods of evaluating field releases, genetic markers for crop pests.

A considerable amount of time was spent by small groups revising and editing the manuscripts so that they can be eventually published as an IAEA priced publication.



2. Consultants Group Meeting on "Engineering, Systems Analysis and Production Modelling for Tsetse Fly Mass-rearing and the Use of Sterile Flies in Eradication Programmes", Vienna, Austria, 23 September - 3 October 1991

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Information was supplied by the tsetse team and staff of the Joint FAO/IAEA Division's Insect and Pest Control Section. In addition, working visits were made to the Entomology Unit of the IAEA Agricultural Laboratory in Seibersdorf.

The consultants conducted a technical, operational and financial review of present rearing methods, equipment, philosophies and production capacities, taking into account one of the recommendations made at the 6th Session of the "FAO Commission on African Animal Trypanosomiasis" held in June 1991 in Harare, Zimbabwe. This recommendation, related to the use of the Sterile Insect Technique (SIT), states that "FAO, through the Joint FAO/IAEA Division, should further investigate and improve the use of sterile insects to strengthen the efficacy of tsetse surveys and, where applicable, consider the use of the SIT to support eradication campaigns where other techniques on their own will not achieve this objective".

In investigating the potential for improved tsetse mass-rearing and analyzing the present costs of pupa/distributable sterile fly production, the consultants noted that:

- (a) The Seibersdorf Tsetse Unit is conducting an effective research and development programme which strives to emulate a production facility while continuing to pursue R&D. The capacity of the present facility in Seibersdorf is practically limited to a colony size of about 150,000 breeding females. The release of sterile males in an eradication campaign of economical relevance would require a colony containing more than 500,000 female flies. Such a population can only be maintained in an organizational, operational and financially justifiable manner if the rearing technology is transferred from an R&D philosophy to one of large-scale production.
- (b) At the current status of the programme, the main cost of production is staff cost, accounting for over 50%. Operational costs are approximately US\$ 0.40 per usable pupa and US\$ 0.60 per sterile male pupa. These costs are in line with other studies on production and are quite good for an R&D operation.
- (c) Estimations of field operation costs, including sterile male release for eradication and sterile female release for detection, indicate the feasibility of SIT programmes in a West African situation, but also show the value of a lower cost of mass-produced flies as an important consideration in making decisions regarding eradication programmes.

The group concluded that:

- (a) The Tsetse Unit at Seibersdorf should focus its structure and activities to R&D with respect to mass-rearing techniques for the SIT in Africa.
- (b) A number of experiments should be conducted which might help to overcome problems and limiting factors of the present



rearing methods. An emphasis on improvements in mass-rearing is justified given the economic indicators shown as a result of the present study.

(c) Written documentation should be generated immediately so that the current production process is defined, controllable, transferable and easily discussed.

(d) In order to assess more rigorously the actual overhead costs to the production colony (i.e. the Glossina tachinoides model) and the scope for targeting cost reduction, it is necessary to identify, quantify and accurately cost the actual overheads of the production unit. Similarly, disaggregation of the consumable usage is necessary in order to carry out constructive cost analysis.

In addressing criteria for the development of successful mass-rearing facility for the SIT in Africa, the group commented on the relative merits of tsetse production contracted to private industry or performed by an agency, regional or national facility, and made a comparison of the advantages of a mobile versus a fixed production facility, also emphasizing the modular system design.

The group recommended that additional independent work be conducted in a timely fashion on the following:

(a) Engineering/design of automation systems, equipment and facility.

(b) Experimental formulation of artificial media substrates by biotechnology industry.

(c) Economic analysis of BICOT operations.

3. Experts Group Meeting on "Survey of the Extent of Medfly Infestation in the Maghreb Countries: Morocco, Algeria, Tunisia, Libya: Programme Phase 2", Vienna, Austria, 2 - 5 December 1991

The meeting was held to review on-going activities under project RAF/5/013 which aims to examine the feasibility of eradicating the medfly from four countries of North Africa. In planning for phase 2 of the project, the group discussed the plan of operation drafted at a previous meeting. The tentative plan included (i) training of local personnel in all control/eradication procedures including the SIT, (ii) development of infrastructure for the programme and (iii) achievement of adequate suppression/eradication of the medfly in pilot trials.

Criteria for field site selection were reviewed and included (i) the need for isolation, (ii) availability of information on year-round survival of the medfly, (iii) size and manageability of test area, (iv) proximity of site to airport and (v) effective quarantine to protect the area. It was agreed that an important element was strong political support for the programme.

In their recommendation for future action, the experts agreed: (i) to hire consultants to produce documents on (a) economic returns and cost-benefit analysis and (b) medfly control (booklet), (ii) that FAO should be the executing Agency, with IAEA providing the technical back-stopping and (iii) that for Morocco, ASPAM/SASMA and for Tunisia, CIAF should be involved in the programme.

Possible candidate sites were selected and the need for training of personnel from all four countries underscored, as was the need for a larger capacity fly production factory.

4. Experts Group Meeting on "Economic Evaluation of Alternative Technologies for Medfly Control in the Maghreb", Vienna, Austria, 9 - 20 March 1992

The Mediterranean fruit fly is a major problem in fruit production in the Maghreb. The extent of the financial burden imposed by the pest is in the order of US\$ 60 million per year, plus approximately US\$ 10 million per year in insecticide treatment costs.

The experts group looked at ways of making economic assessments of various strategies available to meet the problem. These strategic options are as follows:

- (a) Integrated Pest Management without the use of SIT.
- (b) Area-wide Suppression involving SIT.
- (c) Eradication using SIT.
- (d) Certified fly-free production zones using SIT.

Economic information was assembled concerning the extent of the problem and the performance and costs of these control strategies.

5. Experts Group Meeting on "Developing Plans of Work for Alternative Strategies to Meet the Medfly Problem in the Maghreb", Vienna, Austria, 30 March - 10 April 1992

An Experts Group met from 30 March to 10 April in Vienna, Austria, and drafted a document entitled "A Programme for the Eradication of the Mediterranean Fruit Fly from Algeria, Libya, Morocco and Tunisia". The document outlines procedures to eradicate the medfly with primary reliance on the use of sexually sterile flies. A large fruit fly rearing facility of modular design would have to be built in the Mediterranean basin outside North Africa. Eradication protocols require an autonomous organizational structure to conduct the programme. National organizations would have to adopt and enforce quarantines to control movement of fruit fly host material, and to exclude other dangerous pests that lurk outside the region.

The eradication programme would begin in Libya and move westward to the Atlantic until complete. Concurrently with the initiation of the programme in Libya, preparatory activities would begin in the other countries. These countries might also

implement other strategies including certified pest free areas. The latter would permit the export of traditional commodities without the need for post harvest commodity treatment. Certified pest free areas can be established where reinvasion can be prevented at reasonable cost and where the phytosanitary requirements of importing countries can be met.

Funding for the programme would be contributed in part by participating countries and the balance by donors. It is recommended that FAO provide executive leadership for the programme, and that the IAEA Department of Technical Cooperation and the Joint FAO/IAEA Division provide technical backup.

Market development activities should be undertaken just as soon as a decision has been taken to launch the programme. Unless domestic and export markets for fruit and fruit products are expanded, the great increase in fruit production resulting from eradication would cause prices obtained by growers to decline.

The programme would greatly facilitate the diversification of agricultural production, and the development of industries to meet the demands of increased growth in the region. Increased employment opportunities would be created in harvesting, grading, packing and marketing. Also, the programme would provide significant educational activities, and the introduction of new technologies. It will have significant environmental benefits, and ameliorate the problems in dealing with a variety of other pests.

#### B. Future

1. FAO/IAEA Second Research Co-ordination Meeting on "Laboratory and Field Evaluation of Genetically Altered Medflies for Use in Sterile Insect Technique Programmes", Pavia, Italy, 1 - 5 June 1992.
2. Consultants Group Meeting on "Tsetse Genetics and Reproduction", Vienna, Austria, 12 - 16 October 1992.
3. FAO/IAEA Second Research Co-ordination Meeting on "Genetic Engineering Technology for Improvement of the Sterile Insect Technique", Vienna, Austria, 19 - 23 October 1992.
4. FAO/IAEA International Symposium on "Management of Insect Pests: Nuclear and Related Molecular and Genetic Techniques", Vienna, Austria, 19 - 23 October 1992.
5. FAO/IAEA First Research Co-ordination Meeting on "Development of Practices for Area-wide Tsetse Eradication or Control with Emphasis on the Sterile Insect Technique", March/April 1993.



#### IV. TRAINING COURSES

##### A. FAO/IAEA Interregional Training Course on the Use of Radiation and Isotopes in Insect Control and Entomology

This training course will be held at the University of Florida, Gainesville, Florida, USA, from 3 May to 13 June 1992.

Over 100 applications were received from candidates in 47 countries. Unfortunately, due to lack of space, only 20 applicants have been selected for the course. This year, the course will emphasize integration of control methodology for area-wide insect management, and also the biology, ecology and dynamics of pest insect populations subjected to control by the SIT and other methods of insect pest control. The course will include radioisotope use and principles of radiation-induced sterility,  $F^1$  sterility and field application of the SIT. The use of computers in population modelling will be included in the laboratory exercises.

##### B. FAO/IAEA Regional Training Course on Tsetse Control Using the Sterile Insect Technique

It is proposed to hold this training course in July/August 1993 in Tanga and on Zanzibar, Tanzania, where there is currently an FAO/IAEA project to eradicate the tsetse fly Glossina austeni using an integrated approach including the SIT.

Detailed information will be given later including course programme and application procedure, however, nomination deadline would be about April 1993.

##### C. FAO/IAEA Interregional Training Course in Entomology

Proposed venue: Agency's Agricultural Laboratory, Seibersdorf.  
Tentative dates: October/November 1993 (four weeks).  
Detailed information will be provided later including course programme and application procedure.

#### V. DEVELOPMENTS AT THE SECTION'S LABORATORY UNIT, SEIBERSDORF

##### A. Tsetse Fly

Part of the efforts within the tsetse fly team was directed at improving the mass-rearing of tsetse flies. Particular attention was paid to reduce the workload involved and diet expenses for a 100,000 female Glossina tachinoides colony that is maintained to supply technical co-operation projects in Africa with 60,000 - 70,000 pupae per month. A reduction of the feeding days to four per week for producing colony females and a change in the concentration of phagostimulants that are routinely added to the diet resulted in a decrease in cost of the in vitro diet by almost 80%. Current analysis of the mass-production system include the establishment of routine quality control procedures, a review of the laborious processes and an increase in the number of distributable excess pupae.

Colonies of G. austeni, G. pallidipes, G. morsitans submorsitans, G. fuscipes fuscipes and G. palpalis palpalis were maintained on levels sufficient to supply material for TC projects in Africa, for in-house research and for collaborative researchers. Sexually

sterile tsetse flies when released can be used in control operations for direct and specific combat of the pest insect species (SIT) or for ecological monitoring of fly populations in support of other tsetse fly control operations (release of virgin sexually sterile female flies and their recapture). Part of the in-house research was directed at determination of the adult performance and the receptivity of sterile virgin female *Glossina* spp. to mating in relation to their age and the stage when they were sterilized, i.e. either during the late pupal stage or as young adults. A field test in Africa is under consideration to determine the indicatory relevance of the release of virgin sexually sterile female flies and their recapture on the density and the dynamics of a tsetse fly population before, during and after vector control operations.

The following fellows successfully completed their training at Seibersdorf:

Mr. John M. Kababa (Kenya) (3 months),  
Ms. Loyce M.A. Okedi (Uganda) (3 months).

#### B. Medfly

##### 1. Mass-rearing

Adaptation of various temperature sensitive lethal (tsl) genetic sexing strains to mass-rearing conditions was initiated with some promising results. In a previous generation of medfly sexing strains, separation of males from females was done with mechanical sorters that discriminated on the basis of pupal colour dimorphism. In tsl strains, sexing occurs when eggs are treated with hot water which selectively kills the female embryos. Present research is directed to developing a rearing system for colony maintenance and to optimize egg treatment conditions. Furthermore, screening of strains will continue for overall performance under mass-rearing conditions as well as for mating behaviour.

##### 2. Bacillus thuringiensis

Screening of isolates from Guatemalan soils revealed several that produced bioinsecticidal agents. Some agents were characterized as water soluble whereas others were water insoluble. It was discovered that the character of the active agents could be altered by varying the ingredients in the fermentation medium.

Ms. C. Romero received 12 months of training in the project.

##### 3. Genetic Sexing

Work has concentrated on two aspects of genetic sexing. First, a temperature sensitive lethal mutation was tested for its feasibility as selectable marker in a sexing strain. As the results showed, females can indeed be eliminated as early as the egg/early embryo stage without major effects on the corresponding males and, therefore, this mutation was considered to be a good candidate for a sexing gene. Secondly, attempts have been made to improve the stability of genetic sexing strains, especially those built around the temperature sensitive lethal. After mapping this mutation on polytene chromosomes, translocations have been identified having the Y-autosome breakpoint in the vicinity of this sexing gene, a prerequisite for stable strains.

## VI. SPECIAL REPORTS

### A. NWS Eradication From Libya - Update

D.A. Lindquist, Director SECNA/FP, Tripoli, Libya  
(Submitted 7 April 1992)

The status of the FAO-led Programme to eradicate the New World Screwworm from Libya was reported in the August 1991 issue of the Insect and Pest Control Newsletter (No. 46). Since that report, the dispersal of sterile NWS has terminated and surveillance intensified.

The last animal with an NWS infested wound was found on 7 April 1991, one year ago to the day that this report is being written. The last fertile NWS fly captured was on 27 April 1991.

Six months after the last case was located, the dispersal of sterile NWS was stopped. The last dispersal was on 18 October 1991. Surveillance had been gradually intensified from mid 1991 and animal inspections were averaging about 3 million per month from July 1991 onward. No NWS infested animals were found.

The NWS seemed to have been eradicated by the end of 1991. But looking for the last tiny pocket of wild NWS continues. If, by mid-June 1992, no NWS cases or fertile flies are found, the Government of Libya can declare the pest eradicated. The day for this announcement is scheduled for 22 June 1992.

The NWS eradication Programme in Libya has been successful. There are a number of reasons for this success. One of the most important was the total support given the Programme by the Libyan Government. The financial, human, physical and political resources required for success were made available by the Libyan Government through the Veterinary Services Organization of the Ministry of Agriculture. This type of local support is rare.

The reason for the faster than expected eradication was that the team in Libya took advantage of the cooler than normal winter of 1990/91. This cool winter greatly reduced the NWS population in January - March. By initiating the dispersal of sterile NWS throughout the infested area during the first week of February 1991, sterile NWS were waiting for the adults emerging from overwintering pupae in the soil. Thus, eradication was achieved rapidly.

### B. Tsetse Eradication on Zanzibar

M. Vreysen, FAO/IAEA Expert, Zanzibar  
(Submitted 10 April 1992)

Since 1984, the IAEA has provided technical assistance to the Government of the United Republic of Tanzania, through project URT/5/007 to eradicate the tsetse fly Glossina austeni from the island of Unguja (Zanzibar) using the Sterile Insect Technique (SIT). G. austeni is the only tsetse species on the island and is solely responsible for the transmission of animal trypanosomiasis, one of the major factors limiting livestock production on the island. The project is being carried out in collaboration with the Department of Livestock Development, Zanzibar (DLDZ) and FAO/UNDP Animal Disease Project (URT/86/022). The release of sterile males is integrated with other



techniques such as insecticide-impregnated screens and "deltamethrin pour-on" treatment of domestic animals.

The sterile flies are obtained from a colony maintained on an artificial feeding regime (bovine blood fed through silicone membrane) at the Tsetse and Trypanosomiasis Research Institute (TTRI), Tanga. By mid-1990, the colony contained over 45,000 producing females, yielding sufficient surplus males for sterilization and release on the island.

Pre-release studies conducted at the TTRI included determination of sterilizing doses, marking (for release-recapture studies), multiple chilling (to test fly survival after chilling), packaging of males at various densities, and shipping simulation. In addition, pre-release monitoring was carried out in a 1 km<sup>2</sup> defined area in the Jozani forest. Data from this study provided valuable information on relative fly abundance and fly population structure.

Experimental releases started in November 1990 to collect data on transport conditions, release rates and performance of the sterile males in the forest. During a 10-month trial period, more than 100,000 sterile males were released in the northern part of the Jozani. After the necessary treatments (marking, irradiation), flies were given a last bloodmeal at TTRI, Tanga, before being transported by light aircraft to Zanzibar. The total transport time did not exceed 3 hours and losses observed after transport were minimal (on average, 93.0% of the males were released).

Daily monitoring with sticky panels revealed a good adaptation of the sterile males in the forest habitat, with excellent dispersal and survival rates. Moreover, the mating potential and competitiveness of the released males was shown to be efficient with 10 - 20% of the captured females showing evidence of mating with a sterile male.

In addition to the pilot trials, the following activities were carried out during late 1991 and early 1992:

1. Trial releases of sterile females indicated the feasibility of using radio-sterilized female *G. austeni* as sentinel insects in control programmes.
2. Research was carried out to increase the efficiency of the sticky panel as a monitoring device for the elusive *G. austeni*.
3. Fly surveys and monitoring in the northern extensions of the Jozani forest reserve and the Muyuni forest (40 km<sup>2</sup>) revealed presence of the tsetse fly but apparent fly densities were low.

At present, the programme continues with activities directed towards the eradication of the target species from the Jozani forest. Assistance in monitoring is provided to the DLDZ and the FAO/UNDP Animal disease Project to assess the impact of the insecticide impregnated screens on the wild fly population. Monitoring data indicate a reduction in apparent density up to 80% of the original fly population in the southern part of the forest reserve. It is therefore anticipated that mass-releases of sterile male flies will start in May - June 1992 to eradicate the fly from the Jozani forest.

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