INFORMATION CORE FOR SOUTHERN AFRICAN MIGRANT PESTS

PROCEEDINGS

ICOSAMP Workshop

Plant Protection Research Institute, Pretoria, South Africa

21-23 May 2002

Compiled and edited by

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Natural Resources Institute (NRI)
University of Greenwich, UK

Department for International Development, UK

Agricultural Research Council (ARC)
Plant Protection Research Institute (PPRI)
South Africa

The ARC-PPRI in Pretoria, South Africa, is a multidisciplinary Institute that follows a holistic approach to pest, disease and alien invasive plant problems, in line with the principles of integrated pest management as defined in Agenda 21 of the Rio Convention. The Institute provides expertise to agricultural and environmental concerns through research aimed at the promotion of economic and environmentally acceptable pest management strategies in support of sustainable land management in the sub-region and many other African countries. To this end ARC-PPRI is a center of expertise on biosystematics, ecology and epidemiology of invertebrates, fungi, pathogenic and useful bacteria, viruses and the control of pests and invasive plants through optimisation of pesticidal and biological control strategies in integrated management programmes. Research is directed at commercial, small-scale and resource poor farmers to address current and anticipated threats.

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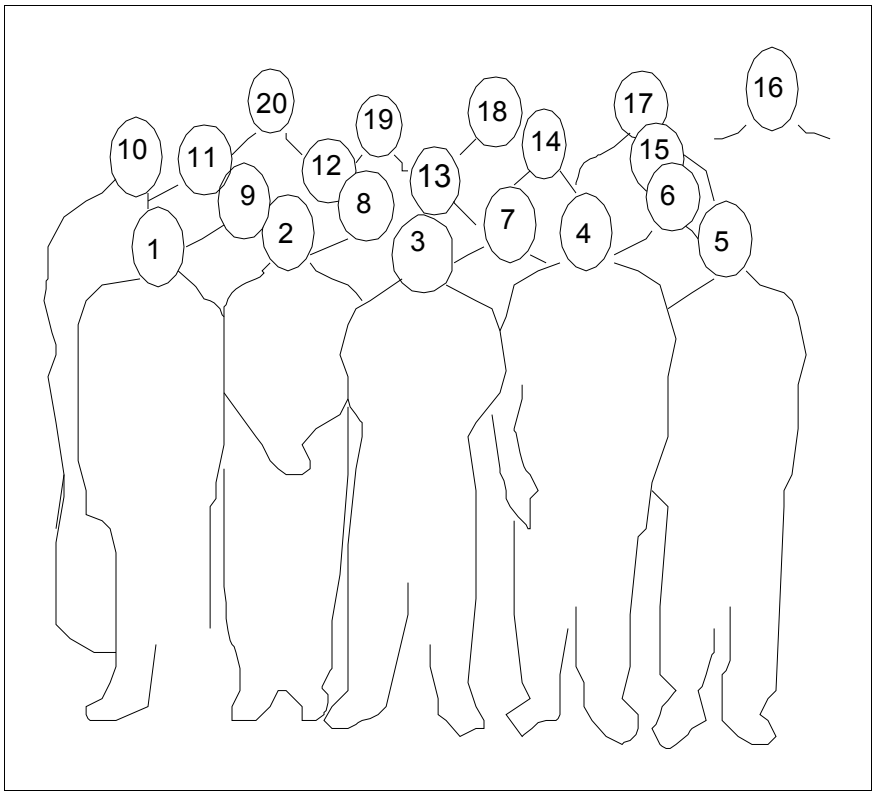

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20	Stefan de Keyser	SADC FANR Representative

ACRONYMS

ADD	Agricultural Development Division
ADI	Acceptable Daily Intake
ALT	Alternate
ARC	Agricultural Research Council
ARD	Agricultural Research Division
CGIAR	Consultative Group on International Agricultural Research
CCD	Cold Cloud Duration
CPP	Crop Protection Programme
CSCU	Crop Sector Coordinating Unit
DACO	District Agricultural Coordinator
DANIDA	Danish Agency for Development Assistance
DFID	Department for International Development
DLCO-EA	Desert Locust Control Organisation for Eastern Africa
EIA	Environmental Impact Assessment
ENSO	El Niño Southern Oscillation
FANR	Food Agriculture and Natural Resources
FAO	Food and Agricultural Organisation
FAQ	Frequently Asked Questions
GDP	Gross Domestic Product
GIS	Geographic Information System
GOES	Geostationary Operational Environmental Satellite
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
HQ	Head Quarters
ICOSAMP	**Information Core for Southern African Migrant Pests**
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IPCM	Integrated Pest Control Management
IPM	Integrated Pest Management
IRLCO-CSA	International Red Locust Control for Central and Southern Africa
IRLCS	International Red Locust Control Service
LGB	Larger Grain Borer
LUSM	Land Use and Soil Management
MAFF	Ministry of Agriculture Food and Fisheries
NDA	National Department of Agriculture
NDVI	Normalized Difference Vegetation Index
NGO	Non Governmental Organisation
NRI	Natural Resources Institute
PBCU	Problem Bird Control Unit
PC	Personal Computer
PMU	Project Management Unit
PPRI	Plant Protection Research Institute
RSA	Republic of South Africa
SACCAR	Southern African Centre for Cooperation in Agricultural Research
SADC	Southern African Development Community
SARCCUS	Southern African Regional Council for the Conservation and Utilisation of Soil
SCRB	Soils and Crops Research Branch
SCU	Sector Coordinating Unit
SSN	Seed Security Network
TA	Technical Advisor
TOR	Terms of Reference
ULV	Ultra Low Volume
URL	Uniform Resource Locator
UK	United Kingdom
USAID	United Stated Agency for International Development
USP	Unique Selling Point
WWW	World Wide Web
ZCFA	Zimbabwe Commercial Farmers Association

PREFACE

The Southern African Development Community (SADC) region is regularly subjected to sporadic outbreaks of migrant pests that pose a threat to the food security in member countries. These include the African Armyworm, four species of locust (red locust, brown locust, African migratory locust, desert locust), and Red-billed Quelea birds.

The **Information Core for Southern African Migrant Pests** (ICOSAMP), a collaborative project between the Plant Protection Research Institute of the Agricultural Research Council (ARC-PPRI) in South Africa, and the Natural Resources Institute (NRI) in the United Kingdom, is funded by the Department for International Development (DFID) UK, and endorsed by SADC.

Following the inception of the ICOSAMP network in January 2000, communication and information networking regarding the distribution and status of migrant pests has been greatly improved within the region.

The first ICOSAMP workshop, held in Pretoria, South Africa (May 2001) brought together researchers and collaborators from various Government Ministries, Research Institutes and NGO's from SADC member countries. The requirements for a migrant pest information system were developed in the workshop and standardised reporting forms were designed.

The purpose of the second workshop held in Pretoria (May 2002) was to:

- provide an opportunity for delegates from SADC member countries to present their annual migrant pest reports;
- evaluate the progress of the ICOSAMP project since May 2001;
- provide training on the use of the ICOSAMP website, database, and GIS viewer,
- and discuss the long-term sustainability of ICOSAMP.

Two representatives from SADC explained the ongoing restructuring of SADC and the current activities of the Crop Sector Unit, and delegates were informed about the preparation of a proposed regional strategy to control migrant pests.

Achievements of ICOSAMP during the past year:

- re-establishment of a regional migrant pest reporting network;
- provision of monthly updates of the migrant pests in the region;
- establishment of regular communication via the ICOSAMP Bulletin and website;
- development of a detailed migrant pest database for the SADC region.

Two ICOSAMP affiliated Quelea projects were also evaluated.

Margaret Kieser
ICOSAMP Co-ordinator

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WORKSHOP PROGRAMME

SUNDAY 19th – MONDAY 20th May 2002

Arrival of delegates and Registration. Monday evening: Cocktail evening

TUESDAY 21st

8:00 – 8:15	Official Opening	S de Keyser
8:15 – 8:30	SADC Crop Sector activities	S Machiri
	TOR for Migratory Pest Strategy in southern Africa	S Machiri
8:30 – 8:45	General structure of Workshop and 'housekeeping'	P Magnuson
8:45 – 9:00	Working session to evaluate usefulness of Quelea forecasting model	A Sutherland
9:00 – 9:45	Review of the migrant pest status in the SADC Region – Country Reports	Country delegates
9:45 - 10:00	TEA	
10:00 – 11:00	Review of the migrant pest status in the SADC Region – Country Reports (continued)	Country delegates
11:45 – 12:30	Quelea forecasting model and desk study of Environmental Impacts of Quelea Control	R Cheke
12:30-13:30	LUNCH	
	ICOSAMP outputs and progress	M Kieser
13:30 – 15:00	Presentation of GIS viewer for ICOSAMP	J Pender
15:00 – 15:15	TEA	
15:15 – 17:00	Open discussion	P Magnuson
	Wrap up	
	Explanation of next day's activities	
18:30	Braai	

Wednesday 22nd

08:30 – 12:00	**Group 1:** ARC-HQ : Training and Usability evaluations	M Kieser
	Group 2: PPRI, Rietondale – Visits to Units	J Pender
		L Lötter
12:00 – 13:00	LUNCH at Rietondale Research Station	
13:00 – 16:30	**Group 1**: PPRI, Rietondale – Visits to Units	L Lötter
	Group 2: ARC-HQ : Training and Usability evaluations	M Kieser
		J Pender
17:00	Return to Dynamics Conference Centre	

Visits of ICOSAMP Workshop delegates to ARC-PPRI Units

GROUP '1'	
TIME	**UNIT**
8.30 – 8.50	*Beekeeping Development* (Jessica Sehlangu)
8.50 – 9:10	*Quelea research activities (*Etienne van der Walt)
9.15 – 9.30	*Locusts & Termite research* (Roger Price & Jannette Mitchell)
9.30 – 10.00	*Nematology Unit* (Dr Esther van den Berg)
10.00 – 10.30	TEA
10.30 – 11.00	*Weeds research Division* (Hildegard Klein)
11.00 – 11.30	*Bioprospecting* (Almie van den Berg)
11.30 – 12.00	*Insect rearing facility* (Leonie Pretorius)
12.00 – 13.00	LUNCH AT RIETONDALE
GROUP '2'	
13.00 – 13.20	*Insect rearing facility* (Leonie Pretorius)
13.20 – 13.40	*Bioprospecting* (Almie van den Berg)
13.40 – 14.00	*Weeds research Division* (Hildegard Klein)
14.00 – 14.20	*Nematology Unit* (Dr Esther van den Berg)
14.30 – 15.00	TEA
15.30 – 15.50	*Beekeeping Development* (Jessica Sehlangu)
15.50 – 16.10	*Quelea research activities (*Etienne van der Walt)
16.10 – 16.30	*Locusts & Termite research* (Roger Price & Jannette Mitchell)

Thursday 23rd

08:00 – 09:00	Summary of evaluations to Plenary Session	M Kieser
	Summary of Workshop	
09:00 – 11:00	Open Discussion	P Magnuson
	Endorsement of ICOSAMP and Quelea projects	
	Future Planning	
	Official Closure	
11:00	TEA	

ICOSAMP delegates attending the training and evaluation session

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1. Introduction: the SADC restructuring

On 14 March 2001, in Windhoek, Namibia, the Head of States and Governments signed an agreement amending the treaty of the SADC. One of the objectives of the exercise was to align the institutional set-up of SADC with the intensified cooperation amongst the Member States.

The following institutions are newly established:

- The Organ on Politics, Defence and Security Cooperation;
- The integrated Committee of Ministers;
- SADC National Committees.

Efficiency of the purely regional institutions is improved through the creation of the Troika.

Among the institutional reforms that were adopted, is the clustering of the 21 sectors of SADC into four Directorates. The FANR Directorate is one of them. The launch ceremony was held on 7th December 2001. This Directorate brings together the overall coordination of FANR, and the Sectors of Crop, Livestock, Agriculture Research, Marine Fisheries and Resources, Inland Fisheries, Forestry, Wildlife, and the Environment and finally Land Management. Once fully established, all co-ordination and direction will come from the FANR Directorate. At the Member State level, the loss of SCU is compensated with the creation of the SADC National Committees.

The functions of the FANR Directorate are being carried out with additional assistance of the seconded staff members from the Member States for a period of 8 months.

2. Progress on Establishment of FANR Directorate

2.1. Office Accommodation

SADC house in Gaborone was not designed to cope with the increased number of officers working in the new structure. Offices for the FANR Directorate have been accommodated at the Zimbabwe High Commission 3rd floor. Some arrangements are still ongoing in order to provide the individual offices with the necessary commodities and work facilities.

2.2. Staff in the New FANR Directorate

Since January 2002 the 6 seconded staff recommended for the FANR Directorate and 1 Technical Advisor have reported for duty at the SADC Headquarters in Gaborone, Botswana. These seconded staff are from 5 different Member States with expertise in the areas of crop and food security, livestock, fisheries (marine and inland), wildlife and forestry, agriculture research and training, and environment and land management.

As decided at the February Council of Zanzibar, a Senior Officer (SEFA) has been appointed to supervise the Directorate as caretaker, pending appointment of substantive Director after the Job

Evaluation Exercise, which will set up the details of the functions, structures, staff requirements, and conditions of service of staff for the whole Secretariat.

2.3. Phasing Out Plan of the Sector Coordinator Units

SADC Secretariat mission headed by the Chief Director and comprising the SEFA and the experts in each areas, undertook missions to Namibia, Malawi, Zimbabwe, Lesotho and twice with the Botswana's authorities in Gaborone. Below is a summary of the dates of the consultation missions.

Dates of consultation missions:

a)	Fisheries Sector in Namibia	18-19 March 2002
b)	Livestock Sector in Botswana	22 March 2002
c)	Forestry and Wildlife Sector in Malawi	25-29 March 2002
d)	Crop Sector in Zimbabwe	7-12 April 2002
e)	SACCAR	30 April 2002
f)	ELMS	

The purpose of the consultation Missions to the Member States was specifically to review:

a) The mandate, functions and activities of the Fisheries, Forestry and Wildlife, Crop, Livestock and SACCAR Sector Technical Co-Coordinating Units (SCUs);
b) Policies and development strategies, staffing, projects as well as organisational aspects in order to identify the aspects which should be transferred to SADC Secretariat in Gaborone, and those which should remain in Member States.
c) Special attention was given to ongoing projects with Project Management Units (PMUs) to assess the need for relocation of these PMUs.

During the visits, the SADC Secretariat Missions held discussions with the SADC Sector Technical Co-ordinator Units including their staff and project coordinators. Meetings were also held with the Permanent Secretaries of related Ministries and SADC National Contact Points.

2.4 Recommendations Made

In making recommendations, the principle used was based on the Council Decision stipulating that all functions related to policy harmonisation and co-ordination should be transferred to the SADC Secretariat, and that Member States should remain only with the physical implementation of projects.

It was noted that the SDU has many Project Management Units which need to be relocated to the SADC Secretariat headquarters, particularly since most of these are on policy co-ordination and cross-sectoral issues and which have to be co-ordinated by the SADC Secretariat. Delays in relocation of these PMUs will split the coordination of the FANR-Directorate.

It was agreed that preparations for the upcoming FANR Ministers' meeting would be undertaken jointly between the SADC Secretariat and the FANR-SDU. Invitation letters for the Ministers and draft-annotated agenda will be drawn up by the FANR-SDU and submitted to the SADC Secretariat for finalisation (incorporation of issues from other sectors) and distribution to the Ministers. It was

also agreed that the Minister of Lands, Agriculture, and Rural Resettlement from the Government of Zimbabwe will chair this year's FANR Ministers Meeting in Maputo, first week of July 2002.

It was noted that the relocation FANR PMUs to Gaborone would require logistical support, particularly office space, accommodation and administrative support, to service the Directorate. The Mission was not provided with a comprehensive Handover Report including summary of projects and the calendar of events for the rest of the year, which are required for the Phasing–in Plan. It is expected that these documents will soon be sent to the SADC Secretariat to complete the Phasing-in Plan.

Editor's Note: Mr de Keyser informed Workshop delegates that, until further notice to ICOSAMP, Mrs Sheila Machiri would remain as the administrative contact point in SADC for migrant pests.

Guest speakers
(L-R) Dr A Sutherland (NRI), Mrs S Machiri (SADC Crop Sector) and Mr S de Keyser (SADC Secretariat)

SADC CROP SECTOR ACTIVITIES

S Machiri
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On behalf of the SADC FANR Sector I would like to express our sincere gratitude to ARC-PPRI, South Africa for hosting this important project and for providing us with a venue for our workshop. My sincere gratitude also goes to DFID and NRI for the technical and financial support it is providing to the programme. To the delegates, your attendance at this Workshop attests the importance your government attaches to issues of controlling migratory pests.

Key Objective of the SADC
" To achieve development and economic growth, alleviate poverty, enhance the standard and quality of peoples of southern Africa, and support the socially disadvantaged through regional integration."

Areas of Co-operation towards integration

- Food security, land and agriculture
- Infrastructure services
- Industry, trade and investment and finance
- Human resources development, science and technology
- Natural resources and environment
- Social welfare, information and culture
- Politics, diplomacy, international relations, peace and security

Sectors of the Food, Agriculture and Natural resources (FANR)
Sub-sector

Responsible Country
Agricultural research

Botswana

Livestock production and animal disease control Botswana
Inland fisheries

Malawi

Forestry

Malawi
Wildlife

Malawi
Marine fisheries and resources
Namibia
Crop

Crop

Food security

Zimbabwe

Given the strong inter-dependence and linkages between the above sectors, Zimbabwe was given the additional task of **inter-sectoral co-ordination**. Implementation of the individual sector programmes remains the responsibility of the relevant country.

***** In line with the restructuring exercise, all the above sectors will now be clustered under the FANR Directorate, based in Botswana.**

Objectives of the FANR Sector

- To increase productivity and overall output, thereby contributing to food security at the household, national and regional level
- To foster efficient development, utilisation and conservation of natural resources
- Generate domestic savings and foreign exchange to finance a gradual, structural transformation of the regions' agriculture-dependent economies

CROP SECTOR

1. Background

In recognition of the important role that crops play in overall economic development, and to rationalise the programmes previously carried out through the Southern African Centre for Conservation and Utilisation of Soils (SARCUSS), the SADCC Council of Ministers in 1998 endorsed the decision of Ministers of Food, Agriculture and Natural Resources to develop a regional programme specifically for the Crop Sector. The rationale for this recommendation was that livestock issues were dealt with specifically by a sector in its own right and that the Southern African Centre for Cooperation in Agricultural Research (SACCAR) did not encompass all the production and policy issues that were associated with crops. Further, the large proportion of SADC's population that is involved in agriculture, principally cropping, necessitated more detailed attention to regional programmes to promote economic development in the cropping sector as a whole. The terms of reference for the sector were approved by FANR Ministers and subsequently by Council in 1998.

2. Objective

The sector's objective is to promote output, protection, processing, storage and utilization of all crops, including perennial crops, as means of enhancing food security and promoting trade and economic development in the region. All crops, including veld forests, horticultural and perennial tree crops will be encompassed.

3. Responsibilities of the Crop Sector

The approved TOR for the sector include the following:

- Regional programmes to improve the availability and use of fertilisers and other Agri-inputs as well as coordinating the use of agro-chemicals
- In conjunction with the water sector, assisting member states to develop and implement economically efficient use of water in irrigation
- Developing and implementing a harmonised and coordinated regional programme related to phytosanitary issues
- Establishing and maintaining an effective regional network to control the spread of scheduled crop pests in a harmonised manner
- Developing and implementing a regional programme to improve the distribution, marketing and availability of seeds of all crops through the promotion of small scale seed production, multiplication and marketing and supply of information of training in seed technology in the region.

4. Operational Modalities

The sector will develop a regional programme aimed at meeting the responsibilities of the sector and which contributes to the attainment of the sector's goals, elements of which would be funded by donor aid as individual projects. A number of projects that were in the former food security sector's programme, such as those relating to seeds, irrigation, and migrant pest control have been incorporated into the crop sector's programme together with some activities previously undertaken by SARCUSS. Activities in each area of responsibility, undertaken as projects at the regional level, will be developed by a series of specialised sub-committees comprised of relevant experts from each member state. These committees include:

- Agricultural Engineering
- Horticultural Crops
- Plant Protection
- Seed
- Soil Science

To date the sector has convened workshops for the two Sub-Committees namely: the Seed and Plant Protection.

5. Programme Review

Three projects are under implementation namely:

1) Support to the Crop Sector Coordinating Unit
2) Promotion of Small-Scale Seed Production by Self-Help Groups
3) SADC Seed Security Network.

The objectives, activities, outputs of the projects including the progress to date is provided below:

Project 1. Support to the Coordinating Unit

The objective of the project is to provide financial and technical support to the Crop Sector Co-coordinating Unit to enhance regional co-operation through the development of regional policies and programmes related to crop production, protection, storage, processing, utilization and trade.

The project will provide support for the core operations of the Crop Sector Coordinating Unit (CSCU). This project will be the springboard for the development and implementation of the regional Crop Sector Programme.

The components of the programme are provision of a Technical Assistant position for a period of three years, salaries and travel costs of the core staff of the CSCU, short term consultancies, capacity building/training, workshops/seminars and office equipment.

The Belgian Government has approved funding for this project. Selection of the Technical Assistant Person has been completed and the T/A has already relocated to the FANR Directorate in Gaborone, Botswana.

Project 2. Small Scale Seed Production for Self Help Groups

In close co-operation with all stakeholders concerned, the project aims at developing a seed supply model for the informal seed sector to ensure seed availability at farm household level and sustainable access to quality seed of appropriate varieties of basic food crops.

Phase I of the project which commenced in April was completed in March 1999. Phase II commenced in October 1999 and will run until March 2003.

The intended beneficiaries of the project is seed-producing, subsistence-oriented smallholder farming families in areas of low production potential in the SADC region, particularly in Zimbabwe, Zambia, Mozambique and South Africa.

The project concept focuses on the empowerment of small-scale farmers who should be in a position to access new varieties and be able to make sound decisions on what varieties they incorporate into their production programme. Another target group is the intermediaries who must be in a position to start the rural based seed production programme.

All these activities have, as a special target group, women who are usually the custodians of seed.

Projects Achievements

- Pilot seed groups established in 4 countries (Zimbabwe, Zambia, Mozambique, South Africa) with NGO'S, Public Service, Donors and Research Institutions
- Developed, in conjunction with intermediaries, guidelines on how to initiate and to develop household seed security schemes
- Researched, published and supported information (16 paperbacks, Newsletter up to 4 times year, Workshops) on seed security matters
- Trained some 50 advisors and 1200 farmers in 1999/2000 season, 60% female. In 2001, a total of 2250 farmers were trained across the 4 pilot countries.
- Held the first strategy workshop with ICRISAT in Tanzania and agreed on an Action Plan for better seed availability
    - Supported the Seed Security Network so it becomes a permanent feature of the CSCU (Crop Sector Co-ordinating Unit)

Project 3. SADC Seed Security Network

The pre-implementation phase of the SADC Seed Security Network (SSN) commenced in June 2001. The SSN is a follow-up to the recommendations of the 1997 SADC/FAO Maseru and the 1999 Kadoma, Zimbabwe Workshops of seed experts. At those workshops, the seed experts agreed that a SSN be established to promote information exchange in the seed sector. Funding for the pre-implementation of the project has been secured from the German Government and the Austrian Government(through FAO). During this phase, a SADC Regional Coordinator for the SSN was recruited for a period of one year to prepare a comprehensive project document detailing action to be taken for the establishment of a fully-fledged SADC Seed Security Network.

The Coordinator is liasing very closely with the seed focal points in Member States and other relevant stakeholders during his work.

A five-year project has been prepared as a follow-up to the pre-implementation phase of the project and funding is now being sought to implement the project.

Objective
The development objective of the project is to contribute to increased seed security and better disaster preparedness in the SADC region, addressing in particular the needs of resource poor farmers in the restoration of farmers' seed systems affected by disasters.

The immediate objectives of the project are:-
(i) A SADC seed security network is established and functioning at regional and national levels
(ii) National and regional disaster preparedness and response is improved in the region
(iii) Information available to facilitate seed supply at commercial and community levels
(iv) Seed rules and regulations rationalized and harmonized in the region to facilitate an integrated regional seed trade.

Phase I of this program, which commenced June 2001 will come to an end in June 2002. A follow-up phase amounting to US$3.1m has been developed and funding is being sought to continue the activities of the program. Cooperating partners who have expressed interest include: USAID, the French Government and GTZ.

Projects to be implemented in the future
Two projects will be implemented in the future. These are:
- Integrated Pest Management for the Control of the Larger Grain Borer
- SADC Phytosanitary and Pesticide Management Harmonisation and Integrated Pest Management Facility

Integrated Pest Management for the Control of the Larger Grain Borer
The regional programme would focus on developing regional capacity in:
- LGB trapping and monitoring
- Support of biological control of LGB
- Standardisation of phytosanitary methods for disinfestations by insecticides and fumigation
- Farmer oriented, participatory approaches in research, development and implementation of IPCM strategies at the small-holder level

The build-up of LGB populations in the wider environment will be carefully monitored on a regional basis and will be contained by the release of the specific predatory beetle *Teretus nigrescens*. The biological control component will be enhanced through the promotion of regional collaborative efforts and standardised guidelines.

The proposed programme would represent a unique collaborative effort between national programmes, SADC's Crop Sector, and several international institutions that have extensive post-harvest experience (FAO, CABI Bioscience, NRI, CSRO and CGIAR members.

Mt. Makulu Research Station in Zambia would host the programme, as that institute has capacity on LGB issues. A Regional Coordinator would be recruited and would be based at Mt. Makulu Research Station. The Regional Coordinator will liaise closely with the National Coordinator in each of the participating countries (Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe) in the implementation of the Workshops, seminars, and exchange visits would constitute part of the programme. The programme was estimated at US$6,3m and would be implemented over a five-year period. Funding is being sought to implement the project. The project will be a collaborative effort between the sector and FAO.

SADC Phytosanitary and Pesticide Management Harmonisation and IPM Facility

The overall objective of the programme would be to facilitate the development of inter-country programmes in SADC to collaboratively respond to the global and regional problems and trends related to trade. The project will encourage sustainable national IPM education programmes and development of policy to promote harmonisation of phytosanitary and pesticide management.

Following a regional Pesticide Management Workshop in Lusaka in February 2002, a fully-fledged regional proposal is been developed with the support of FAO.

Regional cooperation in the control of the spread of migratory pest is an area of priority to the region and the need to forge close cooperation among member states was noted at the formative stages of the Food Security Unit. The Food Security Unit therefore developed a Programme – **Strengthening and Coordination of Migrant Pest Control in the SADC Region** that was implemented from 1991 to 1995 and funded by the German Government. The primary objective of that project was to enhance regional food security through the improvement of the capacity of Ministries of Agriculture in the SADC region to protect crops, particularly cereals from migratory pests such as grain eating birds, African Armyworm and locusts. The activities of the project that were undertaken by that programme include:

- Initiating national plans for migratory pests control
- Training regional and national personnel in general aspects of migratory pests control
- Army-worm trapping networks were set, operators trained and reporting systems set up
- Identification of data processing systems
- Installation of necessary communication equipment and training provided.

We are therefore pleased that ARC-PPRI of South Africa is now following up on the achievements of that programme by providing leadership in the implementation of ICOSAMP. During the last meeting of SADC FANR Ministers held in June 2001, I informed Ministers about the activities of the project and requested them to give the necessary support to the migratory pest focal points. Ministers appreciated the activities of ICOSAMP but however requested the Crop Sector to develop a regional strategy to control migratory to complement ICOSAMP. I have circulated the draft Terms of Reference (TOR) to you all and I am expecting substantial comments from you on this draft, as you are the experts in the field to enable us to refine them.

At a regional Seed Stakeholder Workshop I attended in Pretoria in May 2001, the essentials for an effective network were discussed. These include:

- Organisations should have shared vision and similar values
- Sharing must happen. Networks need to ask themselves what sharing is taking place and how it is happening? How can it be improved?
- Linkages in a network should be just as much between members and their centre (secretariat)
- Members must be prepared to contribute to their network before expecting to take anything from it
- To be judged as effective, a network should contribute to the strengthening of its members.

Chair person, distinguished participants, I hope we keep these points in mind as we proceed with our deliberations and as we as key stakeholders continue to contribute to the efficient running of ICOSAMP.

Let me end up by wishing you success in your deliberation.

DRAFT TERMS OF REFERENCE (TOR) FOR THE ELABORATION OF THE MIGRATORY PEST CONTROL STRATEGY FOR THE SOUTHERN AFRICAN COMMUNITY (SADC)

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1. Background

The SADC Plant Protection sub-committee at their first meeting held in September 2000 approved a project - The establishment of an Information Centre for Migratory Pests in Southern Africa (ICOSAMP). The objective of the project is to establish an Internet based migratory information centre for the SADC region that would provide a platform for technical co-operation and sharing of research information. This would enhance the forecasting efficiency of control organisations by providing early warning information of the outbreak and will assist national crop protection agencies to safeguard food security. The programme is being implemented by the Plant Protection Research Institute of South Africa and is supported by a network of migratory pest control focal points based in each of the Member States. The programme is under implementation and is providing information on the migratory pest situation in the region on a regular basis. Funding for the ICOSAMP project is being provided by DFID.

The SADC FANR ministers at their meeting held in June 2001 in Mbabane, Swaziland fully endorsed the project. However, Ministers instructed that to complement the ICOSAMP Programme, the Crop Sector should develop a regional strategy to control the migratory pests.

2. Scope of work/Terms of reference

To respond to the June instruction of FANR Ministers, it is proposed that a team of two man regional consultants be hired to elaborate the regional strategy. The consultants will undertake the following tasks:

- Provide diagnostic information on the impact of migratory pests at regional level: i.e. the actual damages, the geographical phenomenon, the assessed percentage of risk
- Review the national migratory pest control strategies of the 12 countries (affected by migratory pests) in the SADC; Migratory pests in this case refers to locusts, quelea birds and army-worm
- Identify gaps/constraints in the national migratory pest control strategies and recommend ways in which those constraints could be addressed;
- Review and document past major cross border migratory pests outbreaks and the strategies that were adopted to control the outbreaks. Review the efficacy and cost effectiveness of the strategies adopted;
- Based on a review of the national migratory pest control strategies and cross border control strategies, prepare a comprehensive regional control strategy. The strategy should clearly elucidate the associated operational strategies and the requisite resources (financial and human) required to implement the strategy. The strategy should also clearly delineate the activities to be undertaken at a national level and regional level respectively.

Recommendations on environmental impact assessments in relation to the control strategies should also be included.

3. Conduct of the study

The consultancy work will be undertaken by a team of two regional experts (one Entomologist and one Quelea Bird Expert) over a period of 45 days. The consultants will visit all the 12 countries of SADC and other relevant key institutions such as IRLCO-CSA

4. Timetable

Debriefing and collection of relevant document at FANR, Harare — 7 man-days

Country visits and visits to IRLCO-CSA — 30 man days

Report writing — 8 man-days

Total
45 man-days

5. Budget

Consultancy fees
Regional travels
Report production
Regional Workshop to review the draft strategy

Editor's notes:
Delegates discussed the document and suggested that for the TOR to be a practical workable document for the region…

1. *Standardised formulae should be provided to determine for example the actual damage caused by migrant pests;*
2. *The consultants, who are tasked with the evaluation and implementation of the strategy, should liase closely with migrant pest officials from each SADC country.*
3. *The services of an economist should be included.*

COUNTRY REPORTS

BOTSWANA

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GENERAL SUMMARY

The country experienced early rains in December 2001 and January 2002. Many farmers were encouraged to plant early, but soon the country experienced a drought spell, where many crops were scorched to death by high temperatures and moisture stress.

Migrant pests such as quelea birds bred in the Central, Francistown, Gaborone and Southern regions. In regions such as Francistown which was seriously affected by the drought spell, birds migrated to areas where conditions were favourable.

There were no outbreaks of the other migrant pests viz locust and African armyworm.

CAPACITY

Staff: 12 Regional Plant Protection Officers and 60 District Field Assistants.
Equipment: 4 vehicle mounted Micronair 8110 and 60 Au 7000 SC sprayers.
Surveys: These are conducted by field staff. Traditional breeding areas are monitored especially for quelea birds, and locusts and farmers assist in reporting activities. Armyworm monitoring is undertaken by operators using a network of pheromone traps.

MIGRANT PEST SITUATION: May 2001 – April 2002

African armyworm

There were no reports of armyworm outbreaks in the country. Armyworm distribution is monitored via a network of 44 pheromone trap stations placed strategically along the eastern side of Botswana.

The recordings from trap stations ranged from 0 – 85 moths for the whole season. Only one trap station at Mmashoro was recording catches in that range, while most traps were recording zero catches.

Locusts

Three species are recorded in Botswana viz. the red locust, African migratory locust, and brown locust. No reports were received on these three locusts although monitoring in the source areas was conducted regularly during the breeding season.

Quelea birds

Quelea birds were reported in three agricultural regions namely Central, Gaborone and Southern regions. Birds caused damage to sorghum and millet which had flowered. Control operations in the Central and Gaborone regions were stopped because the crops which had not flowered were wilting due to moisture stress. Birds also absconded in search of food while in the Bobonong area, birds left due to the harvesting of nestlings. Control operations were mainly carried against roosts in the southern region, where sorghum had flowered. The Southern region received better rainfall and birds from regions which were drought stricken, migrated to the south and caused serious damage to

sorghum crops. The control operations were however not so effective because roosts are difficult to control. Chemical control and use of explosives were used to control the birds. The aircraft could not be used because it was grounded for maintenance.

Tables 1 - 4 show the results of the Quelea control operations undertaken at the three regions.

Table 1: Quelea control operations in the Central Region

District	Locality	Date Surveyed	Ha	Date Sprayed	Amount of Chemical Used
Serowe West	Moremelodi	10/01/02	80	24-25/01/02	250 litres
	Dikukumaru	22/01/02	30	No spraying	
Bobonong	Semabye	01/01/02	12	No spraying	
	Molalatau	14/01/02	3	No spraying	
	Bosolame	15/01/02	10	No spraying	
Mahalapye	Mokobeng		18	01/02/02	17 litres
	Thabadiawa		11	02/02/02	13 litres
	Mmalekgala		12	03/02/02	14 litres
	Matswe		13	05/02/02	15 litres
	Mmalekgala		19	06/02/02	17 litres
	Thabadiawa		11	07/02/02	15 litres
	Mangana		9	08/02/02	15 litres
	Mmaphashala		15	No spraying	Crops still at
	Phalla Road		9	No spraying	vegetative stage
	Shoshong West		7	No spraying	
	Shoshong East		7	No spraying	
	Mosolotshane		6	No spraying	
	Kalamare		7	No spraying	
	Taupye		6	No spraying	

Table 2: Quelea control operations in the Gaborone Region

District	Locality	Date Surveyed	HA	Date Sprayed	Amount of Chemical Used
Kweneng North	Sojwe		9	No spraying	
	Lephephe		2	No spraying	
	Mahetlhwe		1.5	No spraying	
	Boatlaname		0.5	No spraying	
Kgatleng	Leshibitse		0.7		
Ramotswa	Sakutshwane		1.8		

Table 3: Quelea control operations in the Southern Region

District	Ext Area	Location	Date Surveyed	Colony	HA	Date Sprayed	Chemical Used
Ngwaketse South	Mmalore			Roost	7	19/02/02	-
	Mmalore			Roost	10	20/02/02	4
	Mmalore			Roost	12	21/02/02	40
	Mmalore			Roost	9.7	16/02/02	39
	Mmalore			Roost	5	20/02/02	15
	Mmalore			Roost	3.7	05/03/02	-
					5		
					15		
Borolong	Hebron	Marojane		Roost	10	04/03/02	-
Ngwaketse Central	Mogapinyane	Bakwenyane		Roost	14	28/02/02	60
		Bakwenyane		Roost	5		21
Ngwaketse Central	Mogapinyane	Bakwenyane		Roost	1	05/03/02	4
	Mogapinyane	Mogapinyane		Roost	10	06/03/02	43
		Mogapinyane		Roost	2	09/03/02	10
		Segwagwa		Roost	15	11/03/02	60
		Mogapinyane		Roost	20	15/03/02	45
		Segwagwa		Roost		15/03/02	36
	Mogapinyana	Mogapinyana		Roost	18	04/03/02	-
	Dinatshana	Dinatshana		Roost	21	18/03/02	-
Ngwaketse Central	Gasita	Segotshane		Roost	60	29/03/02	-
	Gasita	Gaphiri		Roost	16		-
				Total	**277**		**413 litres**

(Editor's Note: Table 4 on next page)

COMMENTS

No research is currently being undertaken on migrant pests.

There is a need for a formula for assessing quelea damage. The current formulae being used do not reflect the practical scenario.

Table 4. Explosives used for Quelea control in the Southern Region

District	Ext Area	Location	Electric Detonator used	Electric Denonator Instant used	Power Booster used	Ha Controlled	No. of 5ℓ containers used	Date sprayed	Petrol used per container (ℓ)	Total (ℓ)
Ngwaketse Central	Segwagwa	Segwagwa Dam	450m	1	63	0.5	46	26/03/02	3	138
Ngwaketse Central	Segwagwa	Segwagwa Dam	1000m	1	89	6	74	28/03/02	3	222
Borolong	Hebron	Sekokwane	1000m	1	139	6	75	29/03/02	3	225
Borolong	Hebron	Sekokwane	300m	1	39	0.5	38	04/04/02	3	114
Borolong	Hebron	Sekokwane	550m	1	46	0.5	46	05/04/02	3	138

LESOTHO

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GENERAL SUMMARY

Lesotho is divided into ten administrative districts. There are four agro-ecological zones: the lowlands, the foothills, the highlands and the Orange River valley. Each agro-ecological zone depicts the type of agriculture activity to be under taken. The highlands are mostly suitable for livestock production; a mixture of crop and livestock production is possible in the lower mountains while higher mountains are good for raising small ruminants (sheep and goats). The Orange River valley is characterised by fragile soils, which make the zone suitable for both crop and livestock production at all levels. The lowlands are warmer with annual temperature ranging from 12-27°C, they also receive higher precipitation therefore lowlands are suitable for extensive farming in both livestock and crops.

Lesotho has no other means of living such as mines. Therefore Lesotho is solely dependent on agriculture but productivity is continuously declining. Agricultural contribution to GDP has also declined from 58% in 1960s and to 23% in the 1980s (anon. 1986), and further to 14% in 1990s (ARD 1998). Agricultural research division is an institution faced with the challenge of reversing the situation through generation, adaptation and transfer of appropriate technologies and information. Through Plant Protection section ARD performs the following activities:

- Develop and/or improve pest management practices including migrant pests
- To identify and/or develop and adapt environmentally and economically sound plant protection technologies
- To provide diagnostic field and laboratory as well specialised services (phytosanitary certificates etc) to clientele.

CAPACITY

Staff: Only 2 personnel in the section, 1 with MSc in entomology, 1 with BSc in general agriculture. 1 collaborating officer (pest controller from crops department); 1 laboratory technician from the university (NUL).
Surveys: It is important when drawing a forecasting plan because given the description of each zone, one can be sure of areas to be frequently visited for monitoring in relation to resources available, however it is important to ensure that the whole country was well under vigilance as far as migrant pests are concerned.

On implementation of ICOSAMP in Lesotho, all concerned stakeholders were consulted. This included the District Agricultural Officers, District Crop Officers as well as extension agents. The objectives of the project were explained to all those expected to enhance the success of forecasting and monitoring. Through a collaborative work, areas to be monitored were selected and people responsible for reporting at district level were nominated. The monitoring is expected to be done as a routine under supervision of the agricultural resource centres at village level. The resource centres are established throughout the whole country as a way of extending agricultural services to the public because they are equipped with extension agents personnel and SMS`s. Each district has a minimum of four resource centres, which basically have to keep an eye should any problem arise in regard to agriculture including migrant pests.

The resource centres make it possible to have a closer look at any incidence of migrant pests as the people working here are in frequent contact with the farmers. Any problem that may come out at village level is reported by the people at the resource centres to the District Agricultural Office, who in turn pass the report to Plant Protection Office. The reporting in the country is done in accordance to the ICOSAMP reporting system.

MIGRANT PEST SITUATION: May 2001 – April 2002

It has been a long time since Lesotho was invaded by migrant pests. The last locust swarm was observed in 1993 in the southern districts. The armyworm is a potential threat as it is constantly observed by farmers but in small numbers that pose no problem as it was seen in 1996.

COMMENTS

The last migrant pest forecasting program stopped in 1996. The initiative was funded by GTZ, and when the donors ceased financing, the government of Lesotho could not afford to maintain the traps and the pheromones sites hence since then no forecasting was in place, until ICOSAMP came into place. **Despite the fact that migrant pests do not haunt Lesotho the presence of ICOSAMP has renewed the activity that was dormant.**

Since then until at present there has never been any reported incidence of migrant pests.

MALAWI

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GENERAL SUMMARY

Armyworm was the most serious migrant pest in Malawi in 2001 to 2002 season (Table 5). The other pest that has caused a lot of damages to crops particularly cassava and maize is Elegant grasshopper, *Zonocerus elegans*. This pest is not migratory but is widely distributed in Malawi and causes yield losses of up to 100% especially, on cassava. No research on migrant pests was conducted in Malawi in the year.

CAPACITY

Staff: 1 Ph D, 3 MSc, 3 Technicians, 1 IRLCO-CSA Field Officer
Equipment: Sweep nets, microscopes (2 dissecting and 1 compound), cages, 2 insect rearing rooms with air conditioners but no humidifiers, sprayers (motorised mist blowers and battery powered ULV sprayers), assorted items (jars, beakers, conical flasks, petri dishes, Schmidt boxes, etc).

MIGRANT PESTS (May 2001 - April 2002)

Armyworm

No outbreaks of armyworm, *Spodoptera exempta*, occurred during the months of May, June, July, August, and September 2001. Armyworm outbreaks occurred from October 2001 to end of January 2002. The armyworms were in stages from 1st to 6th instars. The damage that was caused on crops ranged from 30 to 100%. Some farmers had to replant their crop of maize due to total loss caused by armyworms. There were at least four generations from October 2001 to January 2002. Moth flight activities were not recorded since sex pheromone traps were not functional. A request has been made to the IRLCO-CSA to supply Malawi with sex pheromone. Monitoring for armyworm moths will start when the traps are re-supplied with sex pheromone. This season had more armyworm outbreaks (12,803 ha) than last season, 2000-2001 (715 ha). The reported armyworm outbreak is summarised in Table 5.

Locusts

There was no outbreak of the red locust, *Nomadacris septemfasciata* (Serville), during the period from May 2001 to April 2002. A survey was done in February 2002 in the Lake Chilwa plains, the red locust breeding area. No red locust nymphs and adults were seen during the survey. Only low densities of *Cataloipus sp* grasshoppers were seen during the survey and were not causing any damage to crops but were feeding on grass.

Quelea

No outbreaks of Quelea were observed during the reported period. However, bird scaring activities were done in rice fields in most areas in Malawi between April and May 2001 and 2002 when rice was mature for harvest. The birds that were scared in the rice fields included *Quelea quelea*, but these birds were not in alarming quantities.

Table 5. Armyworm outbreak report summary

Agriculture Division (ADD)	Location	Dates	Area (Ha)	Crops affected	Pesticide used
Kasungu	Lisasadzi, Santhe, Mkanda, Msitu	15-30.10.01	124	Maize Grass	63 L Sumicidin 20 EC
Blantyre	Lirangwe, Chipande	14-17.12.01	2055	Maize Grass	416
Salima	Nankumba	13-17.12.01	650	Maize Rice Grass	144 L Dursban EC
Machinga	Mangochi, Machinga	13-19.12.01	200	Maize Grass	22 L Dursban EC
Shire Valley	Mikalango, Livunzu	14-17.12.01	350	Maize Grass	60 L Dursban EC
Kasungu	Lisasadzi, Santhe, Mchinji, Dowa	20-31.12.02	1,268	Maize Grass	391 L Dursban EC
Lilongwe	Linthipe, Lobi, Mkwinda, Dedza	14-20.12.01	1,014	Maize Grass	300 L Dursban EC
Lilongwe	Dedza, Lilongwe (E and W)	20-26.01.02	1,325	Maize Grass	172 L Dursban EC
Shire Valley	Chikwawa, Mbewe, Mitole, Livunzu, Dolo, Nsanje	15-30.01.02	4,394	Maize Sorghum Millet Rice Grass	330 L Dursban EC
Blantyre	Blantyre Shire, Mwanza, Chiradzulu, Thyolo, Mulanje, Phalombe	15-30.01.02	1105	Maize Inter-crop	224 L Dursban EC
Machinga	Zomba, Malosa, Thondwe, Sondole	15-30.01.02	318	Maize Sorghum	77 L Dursban EC

COMMENTS

There is a need for research on control strategies for Elegant grasshopper as well as Armyworm particularly with respect to biological control.

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MOZAMBIQUE

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MIGRANT PESTS (May 2001 – April 2002)

African Armyworm

Outbreak of armyworm S*podoptera exempta* (Walker) were reported between January and February in Dondo, Nhamatanda and Buzi districts – Sofala Province. Control operations were carried out by Sofala Provincial Crop Protection Services involving farmers and extension staff services. Table 6 provides details of the pheromone trap network in the country.

Locusts

The Red Locust outbreak area namely Buzi-Gorongosa plains in Sofala Province remained relatively calm.

Quelea birds

Mozambique suffers regular infestation of Red-billed Quelea (*Quelea quelea*), which cause considerable damage to small-grained crops such as rice, sorghum, millet and wheat.

A large population of Quelea breeding colonies in this crop season (2001/2002) were reported late in December up to the beginning of February in the traditional breeding areas in Chokwe district – Gaza Province, around the rice irrigation scheme. No control operations were carried out due to late funding availability.

COMMENTS

Problems

- National Migratory Pest Database is facing problem due to computer operation problems
- National Armyworm pheromone trap network (Table 1) reporting has not been effective due to human resource problems
- Transport
- Funding

Table 6. Mozambique Armyworm pheromone trap network: Season 2000 / 2001 / 2002

Trap No.	Station	District	Province	Operator
001	Chimbonila	Lichinga	Niassa	Cipriano Roque e Nandinho Manuel
002	P.Metuga CA	Pemba	C. Delgado	
003	Balama	Balama	C. Delgado	
004	Nampula EA	Nampula	Nampula	
005	Namialo CFA	Meconta	Nampula	
006	Nicoadala CA	Nicoadala	Zambézia	Raúl Caetano
007	Quelimane CA	Quelimane	Zambézia	Aurora Evódio Graciano
008	Tete	Tete	Tete	
009	Zóbwè	Moatize	Tete	
010	Ulónguè	Angónia	Tete	
011	Mucumbura	Mágoè	Tete	
012	Manica	Manica	Manica	
013	Chimoio IAC	Gondola	Manica	
014	Gondola DDA	Gondola	Manica	
015	Sussund EA	Sussendenga	Manica	
016	Mafambisse	Dondo	Sofala	Jovêncio João
017	Lamego	Nhamatanda	Sofala	João Cuvatende
018	Machanga DDA	Machanga	Sofala	
019	Buzi CA	Buzi	Sofala	Cardosa Júnio Macedo
020	Momoíne	Homoione	Inhambane	
021	Xai-Xai	Xai-Xai	Gaza	Francisco Z. Matusse
022	Chókwè EA	Chókwè	Gaza	Ernesto Rafael e Jorge P. Júnior
023	Lionde-Semoc	Chókwè	Gaza	Afonso Filimone Machava
024	Quarentena INIA	Maputo	Maputo	Palmira Tauzene
025	Moamba	Moamba	Maputo	
026	Mafuiane	Namaacha	Maputo	
027	Caia DDA	Caia	Sofala	
028	Chiuta	Chiuta	Tete	
029	Chitima	Cahora Bassa	Tete	
030	Changara	Changara	Tete	
031	Xiluvu	Nhamatanda	Sofala	
032	Capanga	Moatize	Tete	
033	Inhagoma	Mutarara	Tete	
034	Tsangano	Tsangano	Tete	
035	Gorongosa DDA	Gorongosa	Sofala	Carlos Alberto e João Marió Macheca
036	Bárue DDA	Bárue	Manica	
037	Guro DDA	Guro	Manica	
038	Tambara DDA	Tambara	Manica	
039	Mossurize DDA	Morrurize	Manica	
040	Cuamba	Cuamba	Niassa	
041	Sanga	Sanga	Tete	
042	Mueda DDA	Mueda	C. Delgado	Herinques Ernesto
043	Malema	Malema	Nampula	
044	Angoche	Angoche	Nampula	
045	Mocuba CA Bive	Mocuba	Zambézia	Américo P.Ribawé Eernesto Jusane
046	Pebane DDA	Pebane	Zambézia	Maria de Fátima Rafael
047	Massinga	Massinga	Inhambane	
048	Bela Vista	Matutuine	Maputo	
049	Magude	Magude	Maputo	
050	Mecanhelas DDA	Mecanhelas	Niassa	Martins Patricio
051	I.Moçambique	I.Moçambique	Nampula	
052	Nacala Velha	Nacala Velha	Nampula	
053	Macanga	Macanga	Tete	
054	Macossa DDA	Macossa	Manica	
055	Machaze DDA	Machaze	Manica	
056	Mambone	Govuro	Inhambane	
057	Namapa	Namapa	Nampula	
058	Nhacutse	Xai-Xai	Gaza	Américo Zevo
059	Maniquenique	Chibuto	Gaza	Armando J Mathe
060	Bilene - Chicango	Macia	Gaza	José Gomene

NAMIBIA

Paulina Shiyelekeni
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GENERAL SUMMARY

Since 1997/98 season a migratory pest monitoring system was developed on a national level.

In our Northern Region an army worm trapping network has been developed and up till now, reporting takes place at weekly intervals. This year however we ran out of pheromone bait due to the product ban in the UK, who is our usual supplier.

In addition, Red Locust breeding spots in the Liambezi lake area were identified in 1997/1998 and reports on breeding activities, hopper bands and estimates on damages has been collected on an *ad hoc* basis. The same applies to our Southern Region where brown locust activities are monitored regularly.

CAPACITY

Staff: Countrywide, 30 Extension Technicians have been designated to serve the Pest-management co-ordination section in Windhoek and have been trained at regular intervals.

All data collected in the Regions are forwarded to the pest-management co-ordination section (headed by P. Shiyelekeni) at a centralised office in Windhoek, for evaluation and initiation of control activities. In the cases of severe outbreaks, information is forwarded to the Namibian Meteorological Services to be included in their monthly Bulletin.

MIGRATORY PEST SITUATION: May 2001 – April 2002

Armyworm

There were no armyworm outbreaks reported in any of the Divisions.

Locusts

Spotted rainfall during October led to a limited number of brown locust outbreaks in the South Division (Karas region) and red locusts in the North East Division (Caprivi), but did not lead to severe damages. In both Divisions, the outbreaks were monitored and controlled.

In the Caprivi, the red locusts concentrated mainly along the lake (Liambezi) but the damages were minimal. The total area controlled was 1500 ha with a total volume of 1050 litres of Decis used.

Quelea

Quelea outbreaks and Chestnut Weaver outbreaks are reported regularly in the North Central Division, Olushandja Dam (Kunene Region) and the surrounding area of Etosha Pan (Mangetti area). Due to late reporting no control could be done, but other measures were used (beating of drums to frighten the birds).

Other Pests

Blackfly

A joint Blackfly control program along the Orange River between RSA and Namibia could be developed and an official agreement between both countries has been developed and is finalised.

Larger Grain Borer

In the Caprivi Region the incidence of LGB trapping increased drastically (200LGB/trap) (2 weeks interval).

Armoured Bush Cricket

Due to late rainfall of this season no intensive hatching could be observed.

COMMENTS

Problem areas

- Limited capacities with regard to manpower for the co-ordination of the operational teams and for the scientific and technical back up.
- Financial constraints do not always allow efficient monitoring and control operations
- Maintenance and proper handling of equipment is still limited

Progress and Future plans

The development of email communication on a technical level will allow the use of the internet as an information exchange tool up to farmer level. Most of the pest management officers in the country do not have direct access to a computer.

Reporting by farmer communities should be improved. A national project for the development of posters and training brochures is underway. DANIDA will finalise the materials later this year.

A centralised pesticide store of international standard is completed in Okahandja and appropriate training of all involved staff is expected to be provided in July/August 2002 through the funding of DANIDA.

SOUTH AFRICA (Locusts)

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GENERAL SUMMARY

Locust control falls under the National Department of Agriculture (NDA), Land Use and Soil Management (LUSM), Migratory Pest Section.

CAPACITY

Staff: We have three depots: De Aar, Upington and Pretoria. The Pretoria depot is only involved with Quelea control, while the De Aar and Upington Depots are involved with Quelea, Locust and Blackfly control. Four inspectors are based at the Pretoria depot, and two at the De Aar and Upington Depots.

MIGRATORY PEST SITUATION: May 2001 – April 2002

African armyworm

South Africa does not experience any armyworm problems.

Locusts

Although we had good rain during the summer, brown locusts only hatched in the Calvinia West and Ceres districts. Control actions were started on 26 September 2001 and lasted until 17 November 2001 in these two districts.

During this period 1950 brown locust hopper bands and 169 brown locust adult swarms were controlled. 6 combat units were engaged in these control operations, 4 in Ceres and 2 in Calvinia West. A total of 1100 litres of Decis was used.

Blackfly

During the reporting period, 10 applications were undertaken. Normally there are about 20 applications in a year. The river was in flood most of the time and during these high water flow conditions it was not possible to do any control actions.

COMMENTS

Locust control – research is needed on the 'commando' system to see if it is still the most cost effective way to do locust control, and ARC-PPRI are currently looking into this.

Blackfly – research is needed in order to register a third larvicide to be used in times when one of the other larvicides cannot be used.

SOUTH AFRICA (Quelea)

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GENERAL SUMMARY

In South Africa there are basically two methods of Quelea control used:
i) Aerial chemical spraying by aircraft.
ii) Fuel explosions.

All control operations are planned, organised and managed by the chief control inspectors. In some instances when the control of colonies are not economically or practically feasible, attempts are made to relocate colonies to areas where control is possible.

i) Aerial Chemical Control
The service is provided by a private contractor. A Piper Pawnee D is the main type of aircraft used. Spraying is done between dusk and 10pm. A dosage rate of 7-10 litres/hectare is applied, depending on the number of Quelea and type of habitat. Droplets size with a VMD of 220 microns is applied through micronairs.

ii) Fuel explosions
The service is also provided by private contractors. A combination of illuminating paraffin (in moist habitats – petrol) and explosives are used to incinerate the Quelea at their roost. An average of 1500 litres fuel per hectare is used. Although the efficacy of this method is much higher and the impact on the environment acceptably low, the costs are almost double compared to aerial spraying. Due to this reason and logistical limitations, the application of fuel explosions are limited.

CAPACITY

Staff: The Redbilled Quelea Control Section: The Migratory Pest Control Division functions under the Sub Directorate Prevention Services consisting of a Deputy Director, Assistant Director, eight Chief Inspectors and a number of administrative, mechanical, and labour staff. This division is responsible for the control of all agricultural migratory pests in R.S.A. This is done in accordance with the Agricultural Pests Act (Act 36. of 1983) wherein locusts and Redbilled Quelea are declared as Agricultural Migratory Pests. Currently the Act is being revised in order to include river blackfly (*similium sp*.). With headquarters in Pretoria the Redbilled Quelea Control section unit consists of four officers who are mainly occupied with Redbilled Quelea control. At De Aar and Upington (Northern Cape) there are another four officers who from time to time assist with Redbilled Quelea control when the need arises. These four officers are mainly involved with locust and blackfly control.

MIGRATORY PEST SITUATION: May 2001 – April 2002 (Fig.1)

Quelea

- During this period 270 reports were received,

- Resulting in 140 control operations.
- An estimated 52 million Redbilled Quelea were controlled.
- The surface area covered by the 140 control operations totals 536 hectares.

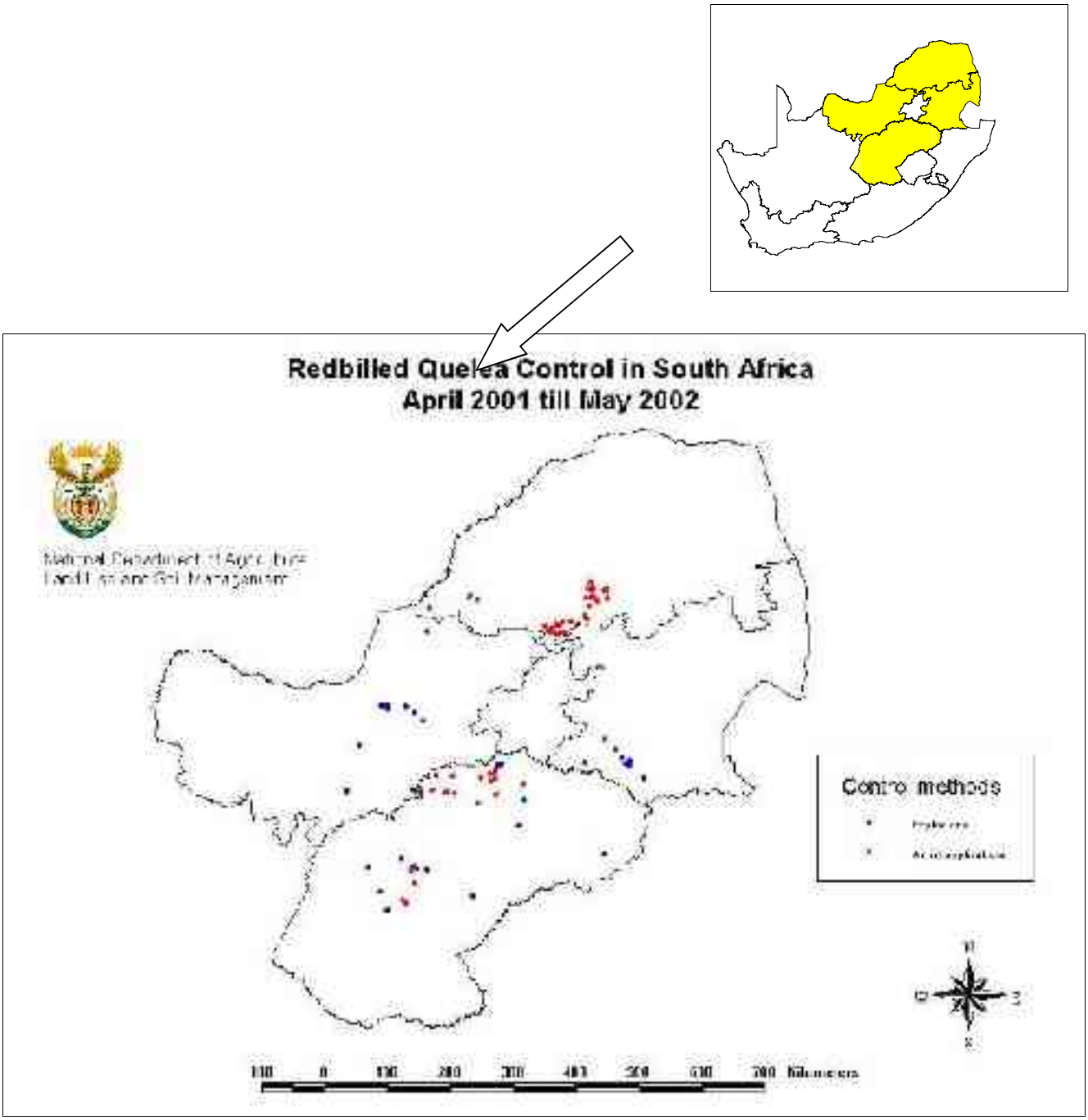
Table 7. Comparison of Fuel and Chemical control operations (May 2001 – April 2002)

Fuel explosion control		**Aerial chemical control**	
Average Efficacy	95 %	Average Efficacy	86 %
Surface area	65.6 ha	Surface area	471 ha
Number ops	48	Number ops	92
No. Controlled	17.7 mil	No. Controlled	35 mil
Cost per Ops	ZA Rands 19 740	Cost per Ops	ZA Rands 15 597
Cost per Ha	ZA Rands 14 444	Cost per Ha	ZA Rands 3 046

COMMENTS

This season has been a below average Redbilled Quelea outbreak season, comprising of only about 56% of the normal average outbreak. The reasons for this are not clear. However it could be speculated that poorer than normal rain and fewer vulnerable crops could be contributing factors. We are expecting a similar extent of outbreak for the 2002/2003 season if similar rain patterns occur. It is also expected that similar amounts of small-grain crops will be planted depending on the envisaged capital return on these crops and exchange rate.

Fig. 1. Redbilled Quelea control operations in South Africa: Apr. 2001 – May 2002



SWAZILAND

Morrison Mbuli
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GENERAL SUMMARY

Plant Protection in Swaziland is fragmented in nature. There are personnel at Malkerns' Research Station, and at the Low Veld Experimental Station at Big Bend. We also have personnel based at the Luvengo and Kwaluseni campus' of the University of Swaziland.

Lastly, we have the Plant Protection Section for Extension, situated in Manzini, of which I am the head. Plant Protection Extension is mainly responsible for Pest and Pesticide management in the country, and conducting trainings for front-line extension and farmers.

The Section is responsible for migratory pest surveys, monitoring and control operations, and also co-ordinating to the outside world. It is also responsible for cotton eradication and citrus inspections in pack houses.

CAPACITY

Staff: The PP Section for Extension has five personnel: one co-ordinator and Head of section, one cotton inspector, and three citrus fruit inspectors.
Equipment: We have one vehicle, 3 motorbikes, one motorised sprayer for both ULV and EC formulations, one microscope, and limited field equipment such as one pair of binoculars.

MIGRANT PEST SITUATION: May 2001 – April 2002

African Armyworm

There were no armyworm outbreaks in the country this year. We had some small catches of armyworm moths in some of the pheromone traps, which did not signal possible outbreaks.

Locusts

There were no locust outbreaks or invasion this year in Swaziland. Nevertheless, surveys were conducted as scheduled.

Quelea birds

Surveys for colonies were undertaken from December to February around the Jozini Dam in Lavumisa, an identified Quelea breeding area. No Quelea were encountered.

COMMENTS

No research work is currently undertaken on migratory pests.

ZAMBIA

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GENERAL SUMMARY

Agriculture is the chief occupation of the people of Zambia and subsistence farmers occupy very extensive areas. About 40 percent of Zambia's population depend on agriculture. A variety of crops are grown in the country by both the subsistence and commercial farmers. Maize being the staple food is the most widely cultivated crop throughout the country.

The Government's agricultural sector policies are aimed at ensuring both national and regional food securities through dependable annual production of adequate supplies of foodstuffs. It is hoped that agriculture can generate income and employment for the unemployed. The industry is expected to ensure that the existing resource base is maintained and improved upon and, contribute to sustainable industrial development.

Migrant pests (Red Locusts, Armyworm and Quelea Birds) fall among the major agricultural pests of Zambia that the team has to deal with at the moment. Studies have shown that these pests have been and are always there in nature where they survive in small numbers that are usually harmless. They feed on crops but are of no economic importance in that state.

In large numbers however, they feed gregariously (armyworms) causing extensive damage to affected crops. In some cases whole fields of hundreds of hectares have completely been wiped out in some outbreaks. Whereas armyworm attack crops in the grass family, red locusts feed on plants belonging to different families.

Due to insufficient knowledge, not much emphasis was put on the study and control strategies of armyworm. Generally, armyworm were found feeding on wild grass or pasture. On a few occasions they were found feeding on cultivated crops in the grass family. Since they did not seem to cause much damage on the cultivated crops it was not considered important enough to warrant spending money on its study. As maize production and areas cultivated with maize increased, so did the attack on maize by armyworm. As recently as the 1987/88 cropping season the country experienced severe attack by armyworm on maize. Maize plants and grass in the surrounding areas were stripped to the midrib. The Ministry of Agriculture Food and Fisheries (MAFF then), decided to have a network of light traps set up to catch armyworm moths for the purpose of warning farmers of any impending outbreaks.

In 1992/93 the country experienced a severe armyworm attack throughout the country. This led to the establishment of a network of armyworm pheromone traps, traps that were more effective than the light traps. The network, consisting of pheromone traps that attracted only S*podoptera exempta*, was established in the 1993/94 season (Fig.2). Representatives from some Southern African Development Corporation (SADC) member countries met in Harare in 1994 and agreed to form a SADC regional network of armyworm traps in each member country. Reporting was and still is directed to the International Red Locust Control Organisation for Central and Southern Africa (IRLCO-CSA) where the data is analysed and results sent to the headquarters in Harare. The results are sent to member countries as well to inform those in possible danger to be on the look out (Fig. 3).

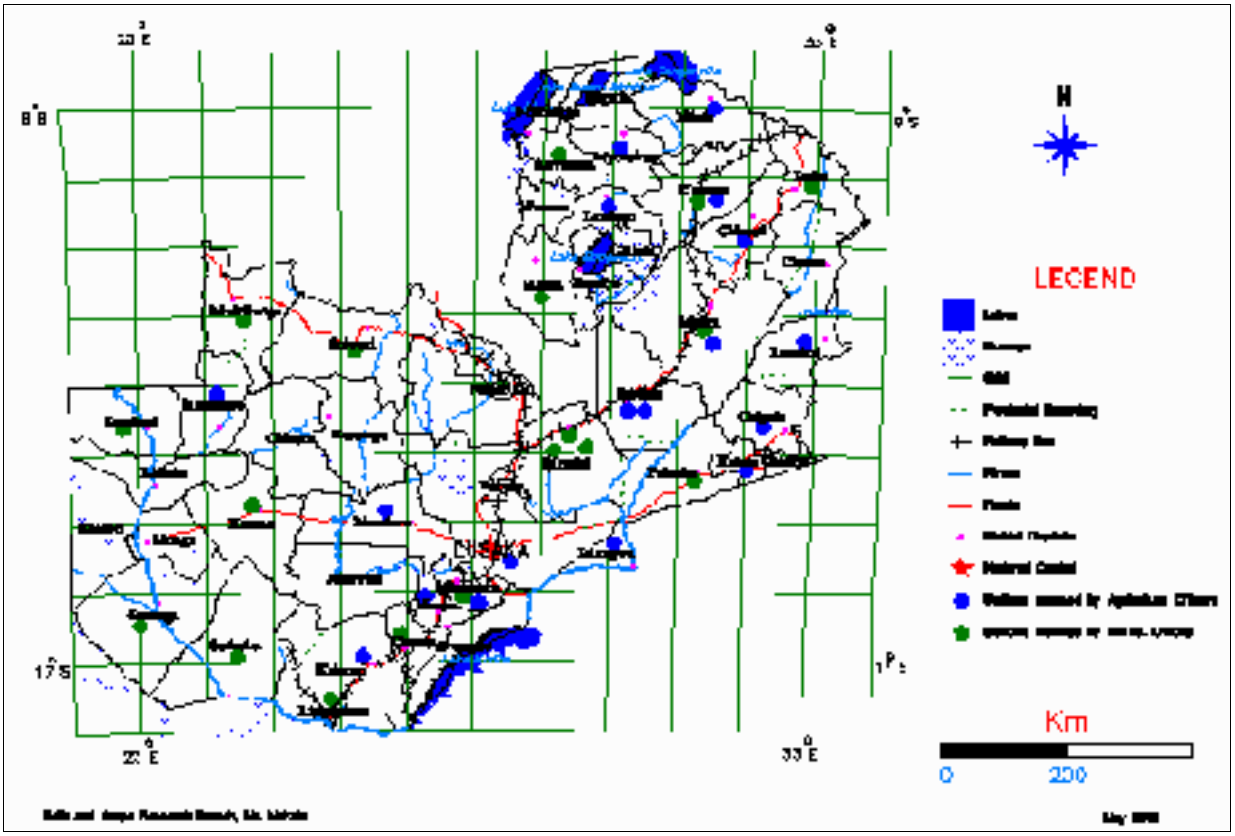


Fig.2 Armyworm trap network in Zambia (*Editor's note: Apologies for poor quality)*

Red Locusts eat everything in their path. They leave nothing untouched. Because of its effect on the plants the problem with red locusts was tackled earlier than the other pests. IRLCO-CSA was set up to solve this problem.

The Quelea problem is well known in this country. However, not much has been done with regards to Quelea. Although there is an improvement in the agriculture sector, it has not reached the level where all the crops are extensively produced. As a result few complaints are received in connection with quelea problem.

CAPACITY

Staff: Most of the policies can be achieved through improved agricultural research technologies. Presently, the Soils and Crops Research Branch (SCRB) of the Ministry of Agriculture and Co-operatives has the overall responsibility of undertaking the soils and crops research activities for major food and cash crops grown by all categories of farmers.

To achieve this the branch has been divided into divisions one of which is Plant Protection and Quarantine Division under which the Entomology Team falls. The main objective of the Entomology Team is to develop and provide appropriate pest control technologies and provide advisory and specialist services to stakeholders.

Personnel from Field Services, Meteorology Department and Research Branch are included in the manning of armyworm pheromone trap stations. The officers from field services and research branch

report any impending danger of armyworm outbreak to the District Agricultural Co-ordinator (DACO) who reports to the headquarters and also to the Research headquarters. The officer from the Meteorology Department reports to their meteorology officer at the Research Station who reports to the head of Entomology at the same place. This information is later communicated to IRLCO-CSA.

The national team does not carry out any reporting on locusts and Quelea. However, IRLCO-CSA does send out quarterly reports to member countries of the organisation. The members are informed about all that is happening in the member countries in terms of outbreaks (red locusts, armyworm and quelea birds).

The control of Armyworm or indeed any other migrant pest is effected by either the farmer (if he can afford it) or by the Ministry of Agriculture and Co-operatives personnel in case of a national disaster. Assistance is given to farmers not familiar with the use of chemicals.

The Government only provides insecticides in cases of national disaster in which case the spraying is done by air by the IRLCO-CSA because the ministry does not have the capacity to carry out aerial spraying against this pest. This also applies in the control of both Red Locusts and Quelea that need aerial spraying.

The Migrant Pest Programme: The programme has been managed and co-ordinated by the Research Branch (Entomology Team) in the Department of Specialists Services of the Ministry of Agriculture and Co-operatives. Though the programme has been running for some years now, no research work has been conducted in any of the areas. Some trials using *Bacillus thuringiensis* were carried out in conjunction with IRLCO-CSA in the 1994/95 cropping season to try and ascertain its effectiveness under Zambian conditions. The team also looked at mortality rates. The trial was conducted only for one season.

No other research work has been conducted since then. The major activity in this programme is the co-ordinating of the armyworm pheromone traps network which aims at forecasting armyworm outbreaks to assist farmers control the pest on time. The network is run in conjunction with the Field Services Branch of the same Ministry and the Meteorologists.

MIGRANT PEST SITUATION: May 2001 – April 2002

African Armyworm

Reports of armyworm outbreaks in the country occurred in August 2001 when the Sugarcane in the southern part of the country was attacked. Although a big area was affected the attack was patchy. Aerial spraying was done using Fastac.

In November 2001 some small scale farmers reported that their maize was being attacked by some caterpillars. The team collected some samples which proved be 4th and 5th instar armyworm larvae. The affected plants included maize and grass totalling 5 ha.

Locusts (*Nomadacris septemfasciata*)

In Zambia surveys are done in conjunction with IRLCO-CSA . The Ministry does not have anyone working on this particular pest. Occasionally when survey is being carried out an officer from the research branch does accompany the IRLCO-CSA Team.

Quelea birds

Few complaints are received in connection with the Quelea problem. No researcher is working on this problem at the moment.

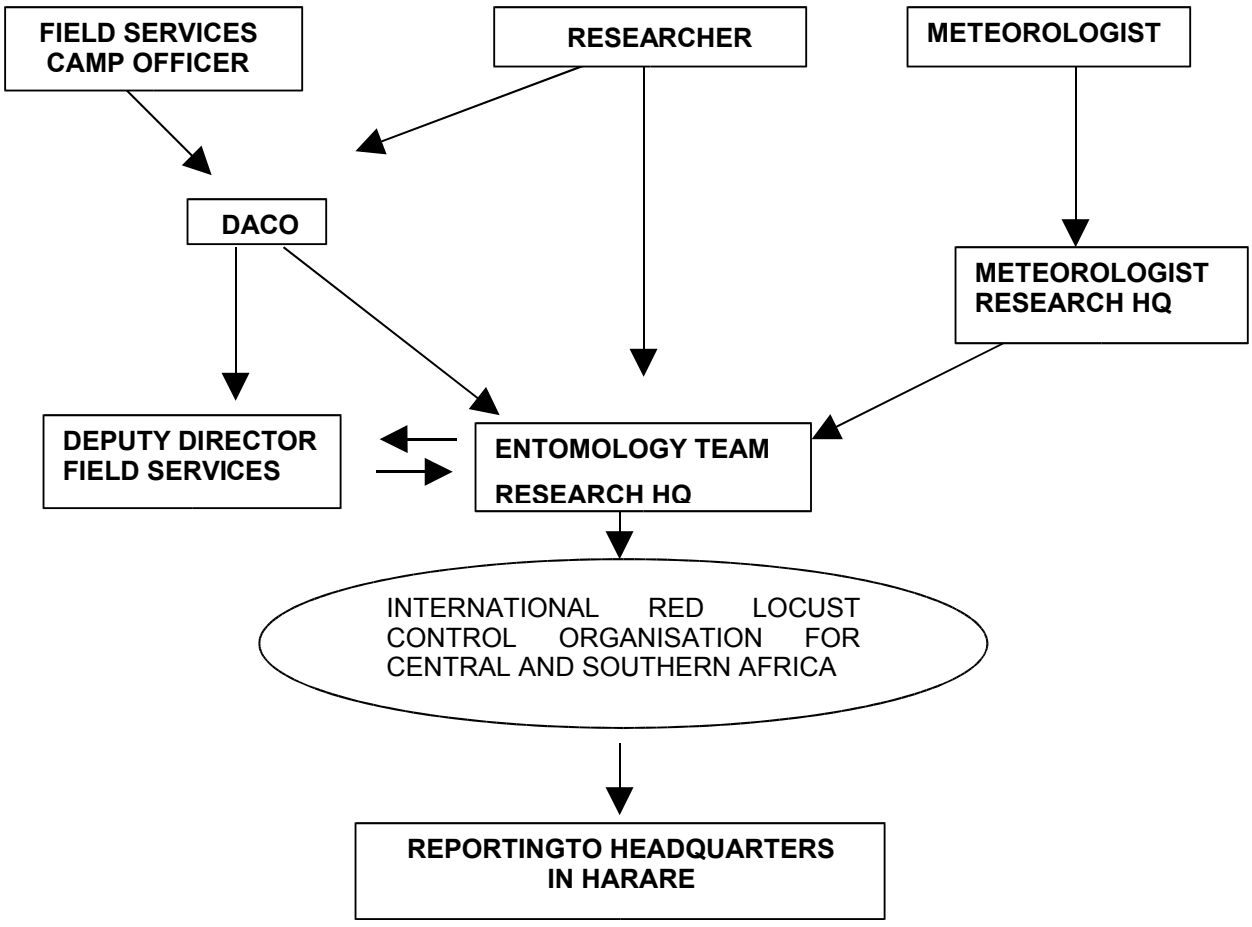
COMMENTS

Major problems faced in reporting and surveying are finances. Armyworm traps need to be manned by people who have some knowledge of the pest and how monitoring is done. This means training en mass the people to man the traps. Reporting cards for armyworm catches are sent in late sometimes at the end of the season. This results in IRLCO-CSA receiving the reports late, which makes it difficult for IRLCO-CSA to report effectively.

Untrained personnel are manning some trap stations. Deaths, transfers, resignations and recently the restructuring process saw the movement of personnel who have no idea about the traps to the existing trap stations. As a result no reports are received from such trap stations until the new person is trained.

Surveys for Locusts and Quelea need to be done periodically. This can easily be achieved if funds are readily available. There is a need to sensitise the government about the need for taking steps to protect the crops from these pests as government is ignorant about these pests.

Fig. 3. SADC network reporting system (1994 – 2001)



ZIMBABWE (Armyworm & Locusts)

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GENERAL SUMMARY

The African armyworm is a serious pest of cereal crops and grasses. The main characteristic of an armyworm outbreak is that the worms appear suddenly and can destroy a crop within a short time. Often outbreaks occur when the farmer is not in a state of preparedness.

CAPACITY

Pesticide stocks (Table 10)**:** The current stock at PPRI is 1,400kg of Carbaryl 85% WP which is in 25kg packs. The pesticide is commonly used for armyworm control but can also be used for the control of locust hoppers. Table 9 shows the amount of Carbaryl available before outbreaks and the amount used. The pesticides stocks for armyworm control in particular Carbaryl 85% WP needs to be increased to maintain amounts of not less than 5,000kg per cropping season. There is an urgent need to purchase at least 1,000kg of Carbaryl 85% WP. Transport remains a major challenge to effective monitoring and controlling of outbreak pests.

MIGRANT PEST SITUATION: May 2001 – April 2002

African armyworm

During the period under review, December 16, 2001 to January 29, 2002, outbreaks occurred in Manicaland, Mashonaland Central, East and West, Matebeleland North and Midlands Provinces including urban and peri-urban Harare and Gweru (Fig.4).

Plant Protection Research Institute (PPRI) confirmed and assessed the situation in most outbreak areas. The Institute supplied resources necessary for control operations including pesticides, sprayers and protective clothing. PPRI, extension staff and farmers jointly participated in the armyworm control campaigns. Outbreaks are likely to persist up to the end of February 2002.

Over 820 hectares of maize, sorghum and grasses were attacked by armyworm in various parts of the country (Table 8). The damage caused by the pest ranged from 40 to 100 % depending on the stage of the crop or grass attacked. About 70% of farmers in Mashonaland Central Province had their maize crop invaded by armyworm and some of them had to re-plant.

Locusts

No reports were received by PPRI during the period under review.

Rodents

No reports of rodent damage were received so far.

Table 8. Areas where armyworm outbreaks occurred and host plants attacked in Zimbabwe

Date	Province/Area	Host plant(s)	Affected area (ha)
1. Mashonland Central			
16-12-01	Mushumbi Pools	Maize and grasses	50
19-12-01	Muzarabani	Maize and grasses	100
20-12-01	Dande (Kapiripiri)	Sorghum and maize	75
21-12-01	Mt Darwin	Maize and grasses	30
24-12-01	Rushinga	Maize and grasses	60
24-12-01	Dotito	Maize and grasses	50
24-12-01	Kaitano	Maize and grasses	60
24-12-01	Mukumbura	Maize and grasses	140
29-12-01	Mahuwe	Maize and grasses	40
30-12-01	Upper Guruve	Maize and grasses	40
10-12-01	Guruve – Chatiza	Maize and grasses	Area not given
2. Midlands			
23-12-01	Gweru urban & peri-urban	Maize and grasses	150
3. Harare			
02-01-02	Highfield	Grasses	0.5
11-01-02	Waterfalls	Maize	0.6
15-01-02	Cold Comfort	Maize	10
17-01-02	Waterfalls	Maize	3
17-01-02	Tafara	Maize	3
4. Mashonaland East			
14-01-02	Goromonzi	Maize and grasses	Area not given
14-01-02	Chitungwiza	Maize	
29-01-02	Kutsaga (TRB)	Katambora Grass	5
5. Mashonaland West			
15-01-02	Hurungwe	Maize	Area not given
15-01-02	Chegutu	Maize	Area not given
6. Matebeleland North			
04-01-02	Bulawayo	Grasses	0.5
7. Manicaland			
02-01-02	Mutare urban	Grasses	2
18-01-02	Nyanga	Maize	Area not given
18-01-02	Nyamoropa	Maize	Area not given

Table 9. Quantities of Carbaryl 85% WP used and in stock at PPRI in Zimbabwe

Quantities of Carbaryl	Unit (number)	Quantity (kg)
1. Before outbreaks	124 x 25kg	3 100
2. Used during outbreaks	68 x 25kg	1 700
3. Amount available	56 x 25kg	1 400

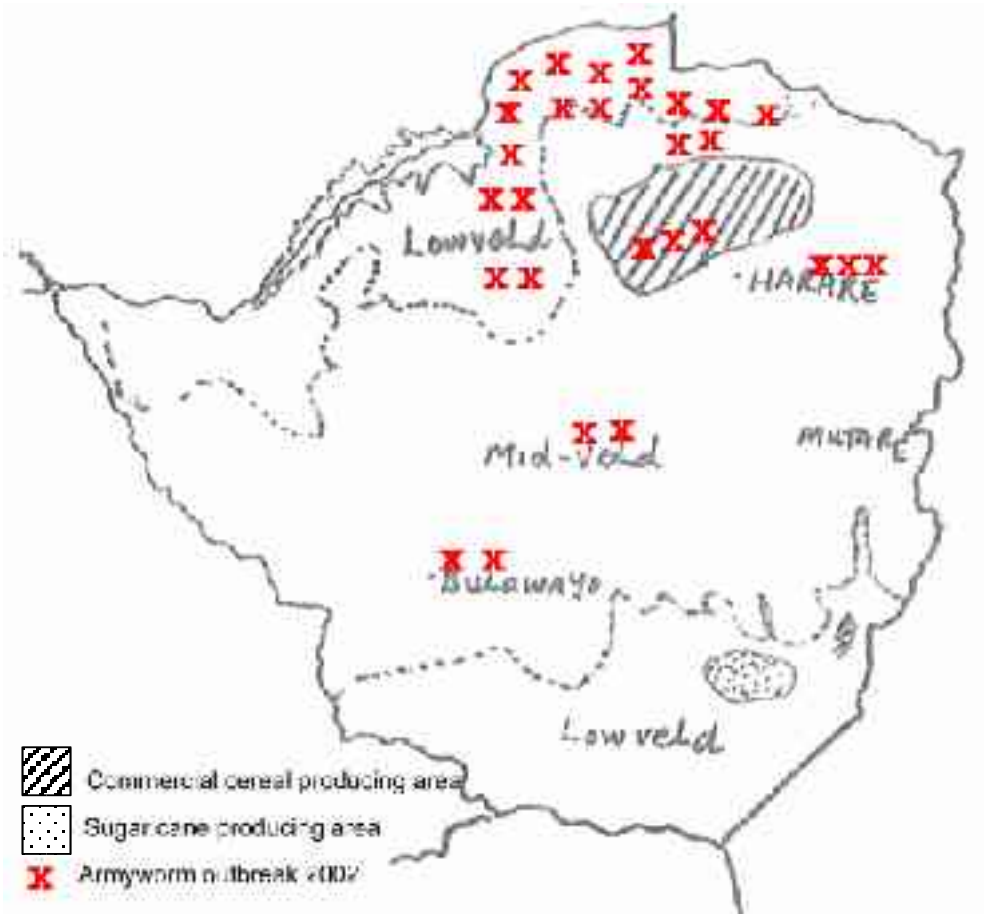
Table 10. Pesticide stocks kept at Gwebi College of Agriculture (26km NW of Harare)

Pesticide	Unit (number)	Quantity (litres)
Decis 25% EC	12 x 20 litres	240
Fenitrothion 96 ULV	78 x 200 litres	15 600
Folithion 60% EC	14 x 25 litres	350
Kontakil 40% EC	31 x 20 litres	620

COMMENTS

Plant Protection Research Institute received no further African armyworm outbreak reports from 30 Jan. to 30 March 2002. There were speculations about locust outbreaks in the country. However, surveillance by PPRI indicated that these were an upsurge of grasshoppers such as *Zonocerus elegans* and *Phymateus viridipes*, not major pests of cereal crops in Zimbabwe.

Fig. 4. Map of Zimbabwe showing armyworm outbreak in 2002



ZIMBABWE (Quelea)

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GENERAL SUMMARY

I am a Senior Ranger in the Department of National Parks and Wild Life Management, Zimbabwe. I joined the Ornithology Unit in 1989, stationed at Lake Chivero just 30 km outside Harare. My job is to assist the Ornithologist in the collection and analysis of data of problem birds and other species. Although I am not directly involved in the spraying operations, I have been tasked to monitor the impact of chemical control on the environment.

In Zimbabwe control is aimed mainly at non-breeding roosts, during the months July to October. Queletox (ULV) is used at current application rates of 2/3 litres per hectare. Motorised back-pack sprayers (AU 8000 of which there are 9) or vehicle mounted sprayers (AU8115 X 2) are used. Occasionally when it is not feasible to use ground spraying methods an aerial spray is called for. A commercial company is contracted to do the spraying at a huge expense to the Department (currently Z$380 000 per hour).

Quelea control has been a mandate of the Department of National Parks since the 1960s. The legislation was enacted primarily to protect the environment from the use of unregistered and toxic chemicals. This situation is unusual as in most other parts of Africa quelea control is the responsibility of Departments of Agriculture. Since 1996 the cost of control has been charged to commercial farmers through their commodity association - ZCFA.

CAPACITY

Staff: We have a special unit within the Department called the Problem Bird Control Unit, established in 1986 whose job it is to control Quelea by chemical poisoning using Fenthion. This unit is composed of one officer and 13 men and is based in Norton about 40 km SW of Harare.
Equipment: At the moment the Unit has three LandRovers, and should be in a position to release up to 3 teams at any one time.

MIGRANT PEST SITUATION: May 2001 to April 2002

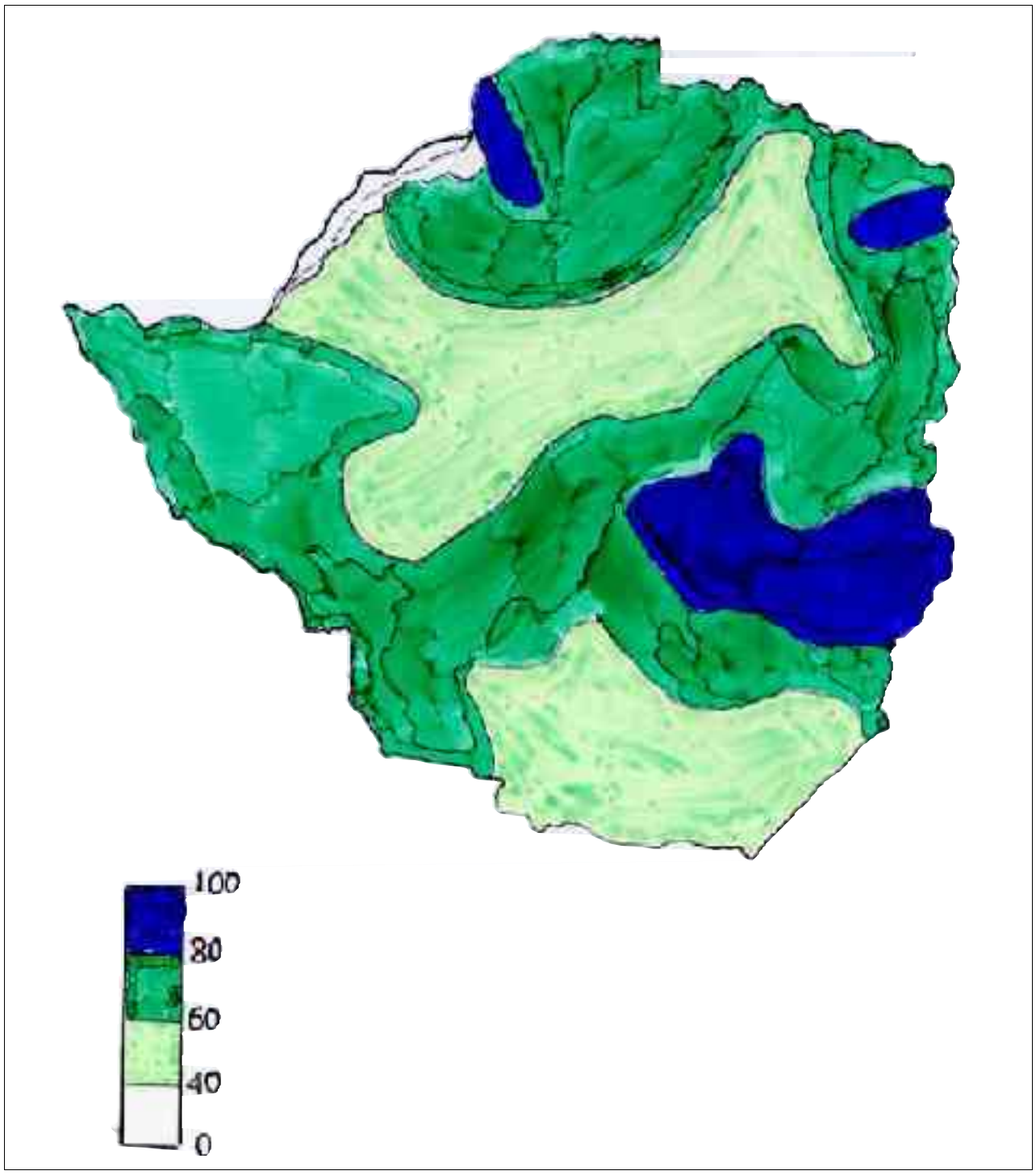
Quelea birds

Relatively few (thirty four) control operations were carried out in 2001 from August to October compared to 53 in 2000 and approximately 100 in 1999. All controls were carried out by the PBCU using Queletox. Roosts were sprayed at sunset using motorised back-pack or vehicle-mounted sprayers at application rates of approximately 2/3 litres/ha. Only six aerial sprays were undertaken due to the prohibitive costs. Most of the control operations (91%) were over water in *Phragmites* reeds. A total of 1456 litres of Queletox were used in 2001.

COMMENTS

No Quelea colonies were found or reported in the country in 2002, due probably to the long dry spell which lasted from January to March (Fig. 5). Alternative control operation procedures, especially control operations over open waters, need to be investigated.

Fig. 5. Percentage of average rainfall in Zimbabwe from 1 Oct.2001 to 4 April 2002



MIGRATORY PEST SITUATION REPORT IN THE IRLCO-CSA REGION, AND RELATED ACTIVITIES: MAY 2001 TO APRIL 2002

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GENERAL SUMMARY

The International Red Locust Control Organisation for Central and Southern Africa (IRLCO-CSA) is the successor of International Red Locust Control Service (IRLCS) which was established in 1949. The IRLCS was formed to investigate the origins of red locust (*Nomadacris septemfasciata* Serville) plagues that had been devastating Africa south of the equator for some time, the latest having lasted from 1929 to 1944.

The primary mandate of the Organisation is to prevent development of locust plagues and to coordinate and reinforce a Member State's action in surveying and controlling red locust if there is an escape from any outbreak area or an invasion. Additionally, the Organisation undertakes research in order to develop novel methods of managing locust outbreaks in the region. Assistance is also rendered to member countries in the monitoring and forecasting of the African Armyworm (*Spodoptera exempta* Walker) and Quelea birds (*Quelea quelea* L.)

The current members are: Kenya, Malawi, Mozambique, Swaziland, Tanzania, Uganda, Zambia and Zimbabwe

MIGRANT PEST SITUATION: May 2001 – April 2002

Armyworm

Outbreaks of armyworm *Spodoptera exempta* Walker, occurred in six of the IRLCO-CSA member countries namely; Kenya, Malawi, Mozambique, Tanzania, Zambia and Zimbabwe. Thousands of hectares of crops and pasture were attacked. The affected farmers effected control with assistance from Ministries of Agriculture.

Details of the outbreaks as reported by affected member countries are summarised as follows:

Kenya

Armyworm outbreaks were reported in February and March from Bungoma, Makueni and Malindi districts (Table 11). The crops attacked included maize, millet and pasture. The affected farmers effected control with assistance from the Ministry of Agriculture.

Table 11: Armyworm outbreaks in Kenya during February to March 2002

District	Crop attacked	Affected Area (Ha)	Remarks
Bungoma	Maize & Millet	14	Larva at 2- 4 instars
	Pasture	400	Density 100 larva/m^2
Makueni	Maize	165	-
	Pasture	1500	Density 80-120 larva/m^2
Malindi	Maize	35	Density 3-4 larva/plant
	Pasture	1215	Density 40-100 larva/m^2

Malawi

Armyworm outbreaks occurred between the months of October and December 2001 in Kasungu, Salima, Machinga, Lilongwe, Blantyre and Shire Valley Agricultural Development Divisions (ADD); while in January and February 2002, outbreaks occurred in Blantyre, Machinga and Shire Valley ADD. Crops attacked included maize, millet, sorghum and pasture. More than 4 000 hectares were infested during 2001 and over 9 000 hectares in 2002. Control was carried out by the affected farmers using assorted insecticides. The Ministry of Agriculture provided technical advice and supplementary insecticides.

Mozambique

Armyworm outbreaks occurred in Caia district, Sofala Province during the moths of April and May 2001. A total of 2 348 hectares out of 2 900 hectares of planted maize were seriously damaged. Some of the affected farmers replanted their fields. No control was carried out because of late reporting of the outbreaks. During January and February 2002, outbreaks occurred in Nhamatanda, Buzi, Dondo, and Beira districts of Sofala Province. Crops attacked included maize, rice, sorghum and pasture. A total of 325 hectares of crop was affected. The affected farmers carried out control using Dursban, Baythroid and Decis with technical and material assistance from the Ministry of Agriculture.

Tanzania

Widespread outbreaks of armyworm affected several districts in central, southern and northern parts of Tanzania. These included; Dodoma Municipal and Dodoma Rural districts of Dodoma Province, Morogoro Rural, Kilosa, Ifakara and Ulanga districts of Morogoro Province, Kiteto, Hannang and Babati districts of Arusha Province, Rungwe, Chunya, Mbeya Rural and Mbarali districts of Mbeya Province and in Manyoni district of Singida Province. More than 7 780 hectares of maize, millet, sorghum, paddy rice and pasture were infested. Control was carried out mainly by affected farmers assisted by the Ministry of Agriculture who provided supplementary insecticides and technical advice.

Zambia
Outbreaks of armyworm occurred in Nakambala Sugar Estate, Mazambuka district, Southern Province and in Mufumbwe district, North Western Province during the months of September and November 2001 respectively. Crops attacked included sugarcane, maize and pasture. Outbreaks in Nakambala Sugarcane Estate were controlled using Fastac E.C. Control was not effected in Mufumbwe district due to lack of insecticides.

Zimbabwe
Armyworm outbreaks were reported during the 2nd week of December 2001 in Zambezi Escarpment near Mushumbi pools and Mazarabani. At the time the outbreaks were reported, the caterpillars were in 2nd to 4th instars. The caterpillars were feeding on pasture and maize. Control was effected by the affected farmers with chemical and sprayers provided by the Ministry of Agriculture. Widespread armyworm outbreaks occurred in the country during the months of January and February 2002. Crops attacked included maize sorghum and pasture. The Ministry for Agriculture assisted the affected farmers in the control of the pest (more details from the country representative).

Swaziland and Uganda
There were no reports of occurrence of armyworm outbreaks in these member countries.

Locusts
The **red locust** situation in most of the outbreak areas remained relatively calm. However, significant populations needing control were located in Iku-Katavi and Malagarasi outbreak areas in Tanzania.

The Iku-Katavi outbreak area has in the recent years been the most active of the four recognised red locust outbreak areas in Tanzania. In September 2001, medium to dense red locust populations were located in at least 12 locations during aerial surveys. A total of 1 160 litres of Fenitrothion 96% was applied against sprayable populations. In spite of the control operations carried out in September 2001, residual populations bred successfully during the 2001/2002 breeding season. Subsequently, medium to dense locust populations were located during aerial surveys carried out in February/March 2002. A total of 710 litres of Fenitrothion 96% was used to control some of the infested areas. Hopper band/fledglings control operations in March 2002 were suspended due to breakdown of survey aircraft. However, survey and control operations are scheduled to resume in May, 2002.

During aerial surveys carried out in September 2001 in the Malagarasi outbreak area, Tanzania, isolated to medium heavy populations of red locusts were located in islands of grass where grass burning had not taken place. A total of 350 litres of Fenitrothion 96% was used to treat more than 700 hectares of infested area. Although there was no physical check carried out in February/March 2002 in this outbreak area, a similar situation to that prevailing in Iku-Katavi is likely.

The red Locust situation in the other outbreak areas namely, Lake Chilwa plains in Malawi, Buzi Gorongosa in Mozambique, the Rukwa Valley and the Wembere plains in Tanzania and the Kafue Flats in Zambia remained relatively calm.

Quelea birds
Outbreaks of Quelea birds were reported in Kenya, Tanzania and Zimbabwe. Crops attacked included rice, sorghum, millet and wheat. In Tanzania, the Organisation participated in the survey and control operations in collaboration with the Ministry of Agriculture.

Kenya
Red billed Quelea and other grain eating birds were reported causing damage to wheat in Narok district, Rift valley Province in May/June 2001 and to irrigated rice in Ahero Rice Scheme, Kisumu district in September/October 2001. Control using Fenthion 60% was effected by the National Crop Protection Branch in collaboration with the Desert Locust Control Organisation for Eastern Africa (DLCO-EA) who provided a spray aircraft. There were no reports of Quelea attacking crops in 2002.

Tanzania
Quelea birds were reported causing damage to small grain cereals in Dododoma, Tabora, Shinyanga, Singida, Mwanza, Mara, Arusha and Mbeya regions between March and July 2001. Crops attacked included rice, sorghum and millet. More than 31 colonies and 37 roosts were sprayed using over 4 960 litres of Fenthion 60 %. The Organisation participated in surveys for Quelea roosts and colonies by providing a bell 206 helicopter.

Red billed Quelea breeding commenced in the country during the months of February/March 2002 in the Dodoma and Tabora Regions. Infestation of the birds subsequently spread into Shinyanga, Iringa, Singida, Arusha and Mwanza regions. Control operations were still in progress at the time of compiling this report.

Zimbabwe
Quelea birds were reported causing damage to winter irrigated wheat. Control of small roosts was undertaken in October in the Central Province, 87 km North of Harare.

Malawi, Mozambique, Swaziland, Uganda and Zambia.
There were no reports of Quelea outbreaks received from these countries.

OTHER ACTIVITIES

Research
Determination of Susceptibility of Red Locust to Dimilin OF-6
During 2001, laboratory tests of Dimilin OF-6, an oil flowable formulation containing 60g a.i per litre of diflubenzuron, were carried out against laboratory reared populations of red locust *Nomadacris septemfasciata* Serville. The results were variable but showed potential for field trials.

Field trials of the product were carried out in March 2002 against red locust hopper bands (L3-L6) in the Iku-Katavi outbreak area, Tanzania. The chemical was mixed with Jet A1 aviation fuel and applied using Cessna 185 aircraft fitted with Micronair AU 4000 spray gear. Assessment was carried out over a period of 8 days when most of the hoppers were expected to have fledged. Hoppers from treated and untreated (control) bands were also held in bottles and fed daily with treated and untreated grass respectively for 14 days.

Laboratory results showed that Dimilin has mortality effect on red locusts. Field results were erratic and hence no firm conclusions could be made. The field trial conditions were not ideal and there is a need for repeat trials to be undertaken in order that meaningful conclusions on the effects of the product on red locust hoppers can be made.

Field trial of Metarhizium anisopliae* var. *acridum *against red locust.*

Efficacy field trials of fungal entomopathogen, Green Muscle™ (*Metarhizium anisopliae* var. *acridum*) were carried out in February 2002 against L3, L4 and L5 red locust *(Nomadacris septemfasciata* Serville) hoppers in the Iku-Katavi outbreak area, Tanzania. The mycoinsecticide was applied at a dose of $50gha^{-1}$ at $2lha^{-1}$. The data collected is being analysed and results will be published.

This work is being carried out in collaboration with CABI African Region Centre (CABI-ARC, Nairobi, Kenya); CABI Bioscience Silwood Park, Ascot, UK; Plant Protection Research Institute Pretoria (ARC-PPRI), Republic of South Africa; National Plant Protection Division, Tanzania and Mt Makulu Agricultural Research Station, Zambia. The three year project is funded by the Department for Foreign and International Development (DFID), UK.

Armyworm Pheromone trap network

The Organisation continued to strengthen the armyworm monitoring capacity of countries within the region by providing pheromone traps and accessories. Botswana was issued with 800 armyworm pheromone capsules while Malawi was issued with 40 armyworm traps and 100 lures in October 2001 and May 2002 respectively.

Reporting and Control

Red Locust: Staff of IRLCO-CSA report directly to Organisation headquarters. IRLCO-CSA is responsible for control.

Other locust species: Extension staff report to Ministry headquarters and Liaison officers report to IRLCO-CSA. The Ministry of Agriculture is responsible for control, however IRLCO-CSA gives assistance.

Armyworm & Quelea birds: Reporting and control is the responsibility of individual member countries. However, IRLCO-CSA assists Member States in forecasting, and when requested by a member country, assists in control at an operational fee.

Greatest constraints - Inadequate financial resources - Late reporting.

ENVIRONMENTAL IMPACTS OF QUELEA CONTROL AND A MODEL FOR FORECASTING QUELEA MOVEMENTS AND BREEDING IN SOUTHERN AFRICA

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Editors' Note: *Screendumps of Prof. Cheke's presentation are provided below.*

A project entitled **"Forecasting movements and breeding of the Red-billed Quelea bird in southern Africa and improved control strategies"** is being supported by the Crop Protection Programme (CPP) of the UK Government's Department for International Development (DFID).

Two of the project's main activities are:

1) A desk-based assessment of the environmental impacts of quelea control operations
2) A computer-based model for forecasting the timing and geographical distribution of quelea breeding activity in southern Africa.

The **EIA desk study** examined reports on the effects of control by both spraying with fenthion and by explosives on non-target organisms and in ecologically sensitive areas such as wetlands and near bee hives. It also examined possible effects if people eat Quelea killed by sprays or explosions. Non-targets affected by sprayings include birds, especially raptors and other predatory species, mammals, reptiles, insects such as ants, Carabidae, Tenebrionidae, Acrididae, Gryllidae, Tettigonidae and Mantidae and, in wetlands, Crustacea.

As fenthion is very toxic to wildlife, it is recommended that an alternative avicide that is more specific for Quelea is sought and research is needed into methods that increase the efficiency of knock down so that secondary poisoning is reduced at least outside the sprayed area.

Adverse effects can be reduced by scaring non-target animals away from colonies before control and for 2 days after treatment. In addition, dead Quelea need to be removed from sprayed sites to prevent secondary poisoning. Spraying should never take place near bee hives as fenthion is also an insecticide.

The nutritional content of Quelea is high as the birds have a calorific value greater than that of dried mammalian meat and five times the amount of protein of staple cereals. Thus, Quelea nestlings harvested from nests in unsprayed colonies are a good source of food for the rural poor.

Collection of dead Quelea for food after fire bombing is normally safe but combustion must be efficient to prevent pollution from un-burnt fuel. However, consumption of birds killed by fenthion is **not** recommended as eating more than one treated bird could result in the daily acceptable intake (ADI) being exceeded. Survey methods for pre-spray and post-spray comparisons of abundance of non-target species and other protocols need to be standardised to allow comparisons between effects in different areas and cholinesterase assays and residue analyses are needed on vertebrate deaths attributed to organophosphate poisoning.

The **Quelea forecasting model** relies on rainfall estimates derived from Cold Cloud Duration (CCD) data collected from the Meteosat satellite.

During the model runs, each degree square is allocated a status according to one of four possible conditions:
(1) insufficient rain has fallen to permit activities associated with the start of a quelea breeding season;
(2) sufficient rain (>60mm) has fallen to allow grass seed germination forcing birds to initiate their early rains migrations away from that square;
(3) six weeks have passed since condition 2 started and sufficient rain (>250mm) has fallen during the preceding 5 weeks to allow breeding to occur; and
(4) breeding is unlikely as more than 5 weeks have elapsed since breeding became possible.

The output is presented as maps with information on where Quelea had bred in the past (and hence the habitat was suitable) or where they had never been recorded at all (where the habitat is presumably inimical to them) superimposed.

The model predicted that in 2001 early rains migrations started simultaneously at opposite ends of the Quelea geographical range i.e. Angola and south-eastern South Africa. By mid-November the model was predicting that the birds would have been concentrated into restricted parts of Botswana and into the area surrounding where the Zimbabwe, South Africa and Mozambique borders coincide. At the same time, the first area suitable for breeding would have been in Eastern Angola close to the Zambian border. This zone gradually expanded but only Angola and Zambia and the Caprivi strip of Namibia were involved until the end of December, when breeding could take place in Botswana, Zimbabwe, Mozambique and Malawi as well. At this time, the first unsuitable areas were signalled and these expanded until the beginning of February 2002 when they split the breeding areas into separate eastern and western groups.

Early versions of the model underestimated activity in southern Botswana, Mozambique and South Africa but, after adjusting the algorithm for rainfall estimates in line with those of the GOES Precipitation Index and reducing the threshold for breeding from 300mm to 250mm, the predictions were broadly consistent with observed events.

Screendumps of MS Powerpoint slide presentation

Slide 1

Quelea Project Desk Study on Environmental Impacts of Quelea Control

- Desk Study of Environmental Impacts of Quelea Control - Andrew McWilliam (NRI)
- Inputs from Zimbabwe (T. Couto, P. J. Mundy) and South Africa (DLRM/PPRI)
- Inputs from literature and "grey" literature

Slide 2

Control Methods

- Ground or aerial application of Queletox ® (60% fenthion, usually at 4 l/ha in ULV formulation) to breeding colonies and night roosts.
- Fire-bombs and explosives

Slide 3

Scope

- Toxicological properties of fenthion have been well documented (US EPA 2001)
- Collation of records of non-target casualties from quelea control to emphasise the need for alternative strategies and methodologies.

Slide 4

Good Practice

- Control only where economic damage occurs. Breeding colonies or roosts are unlikely to threaten crops further than 10 and 30km away, respectively.
- Where control cannot be avoided by earlier planting of crops it has to be timed to occur before young birds fledge
- Avoid wetlands

Slide 5

Studies

- Effects of control on non-target organisms
- Effects of control in ecologically sensitive areas.

Slide 6

Effects on Non-target Organisms

– Chemical control
  - Non-target impact of fenthion, the chemical of choice for many years.
  - End of breeding season > 100,000 Quelea per ha, so 1500 kg/ha of poisoned birds at control site, providing an irresistible meal to scavengers and predators, which themselves may be debilitated or killed by secondary poisoning.

Slide 7

Extent of application

- South Africa: 52,658,000 quelea controlled per year in 1988-2000 in average area of 1243ha/year. 173 control operations per year. In 1999/2000 average quelea kill per colony (mean size 7ha) was 385,000 birds.
- Zimbabwe: 13,500,000 birds sprayed in 1988
- Ethiopia: 37 sites (mean 41ha)
- Sudan: 145 sites (mean 205 ha)

Slide 8

Non-target exposure

- 80 species of predatory birds at breeding colonies in W. and C. Africa.
- Quelea eating mammals ranged from genets and baboons to hyenas and lions. Snakes and monitor lizards prey on eggs and nestlings.
- Colony in Kruger NP: 1,200 eagles and 300 Marabou Storks. 19 species of predatory birds and vultures.
- Predation on nests: 60% of nests torn open

Slide 9

Non-target exposure: invertebrates

- Kenya: extensive mortality in 14 families of insects and spiders - with particularly high residues found on Carabidae, Acrididae, Gryllidae, Tettigonidae and Mantidae.
- Senegal: ants, carabid and tenebrionid beetles were most affected

Slide 10

Non-target exposure

- Reports on non-targets collated from Botswana, Kenya, Senegal, Somalia, South Africa, Sudan, Tanzania and Zimbabwe
- Resident populations of susceptible species (especially predators that bio-accumulate fenthion) can become locally scarce after years of repeat spraying

Slide 11

Technical considerations

- Aerial spraying at a quelea roost site, with ULV fenthion at 3 l/ha (concentration of 64% (m/v) and droplet size volume median diameter (VMD) of 90 microns), found off-target drift as far as 3km away.
- Persistence longer than previously reported at 64 hours in air and 46 days in soil.

Slide 12

Technical considerations

- Aerial drift of small droplets a problem of ULV application as more non-target animals are exposed over a wider area, leading to more secondary poisoning. More carcasses within a 2km radius of sprayed colony in Chad than inside the colony.
- Larger droplets produced when fenthion in a 50:50 diesel mixture which improves kill efficacy.

Slide 13

Technical considerations

- Greater efficacy achieved by increasing the droplet size from a VMD of 90 to 180 microns (and a volume rate increased to 8.7 l/ha). This also means that debilitated quelea do not fly off and increase the area in which secondary poisoning of predators can occur.

Slide 14

Recommendations

- Fenthion very toxic to wildlife, so need alternative avicide that is more specific for quelea.
- Research needed into methods that increase the efficiency of knock down (perhaps the application of surfactants) so that secondary poisoning is reduced at least outside the sprayed area.

Slide 15

Recommendations

- Scare non-target animals away from colonies before control and for 2 days after treatment while residue levels decline. (In Zimbabwe, beaters used to disturb reed beds containing water birds during late afternoon before spray. After spray, no non-target birds found but 26,400 dead quelea).
- Remove dead quelea from sprayed sites to prevent secondary poisoning.

Slide 16

Explosives

- Few studies
- South Africa: 100 Black-shouldered Kites incinerated after fuel-explosion, which also polluted and destroyed habitat. Effects similar to sprays: 3,509 non-target kills recorded from 150 operations.
- Kenya: only 1 bird found after 10 fire-bomb operations
- Nigeria: many birds of prey killed at explosions in acacia bush

Slide 17

Control in Ecologically Sensitive Areas

- **Honey bee colonies**
  Nine colonies of honeybees exposed to relatively low levels of fenthion (0.05 lb/acre) after a single aerial application lost their queens
  Should never spray near hives as fenthion is also an insecticide.

Slide 18

Control in Ecologically Sensitive Areas

- Aquatic Habitats
- Crustacea are highly susceptible to fenthion.
- Orange River protocol used declines in population densities of crustacea and aquatic insects (Odonata, Ephemeroptera, Hemiptera, Coleoptera and Diptera) as a sensitive indicator of fenthion pollution and as a proxy for residue analysis.

Slide 19

Implications for use of quelea as a food source for the rural poor

- 8 million quelea Awash River Valley of Ethiopia provided 37 tons of dried carcasses
- Nutritional content of quelea high: calorific value > dried mammalian meat and 5X protein of staple cereals
- Collection of nestlings from breeding colonies most productive just before they fledge. 3.5 tons of quelea chicks harvested by 500 people

Slide 20

Implications for use of quelea as a food source for the rural poor

- Collection of dead quelea for food after fire bombing is normally safe but combustion must be efficient to prevent pollution from un-burnt fuel.
- Consumption of birds killed by fenthion is **not** recommended. Acceptable Daily Intake only 0.001 mg/kg of body weight. Allowing for a 100 fold error, this would only permit consumption by an adult of 1 treated bird

Slide 21

Development of EIA protocols

- Develop survey methods for pre-spray and post-spray comparisons of abundance of non-target species
- Carcass searches and transect-surveys for birds and reptiles. Sweep-netting, malaise, pitfall, and canopy traps for invertebrates.
- Cholinesterase assays and residue analysis for vertebrate mortality attributed to organophosphate poisoning.

Slide 22

Model for forecasting quelea breeding

- R.A.Cheke & J.F.Venn (NRI, University of Greenwich)
- P.J.Jones (University of Edinburgh)
- M.Todd (University College London)
- D.R. Kniveton (University of Sussex)
- Colony data from NRI quelea archives plus new data from *Atlas of Southern African Birds* and from collaborators in Botswana, Mozambique, Namibia, South Africa, Swaziland and Zimbabwe
- Sponsorship: The Crop Protection Programme of the UK Department for International Development

Slide 23

Quelea quelea lathamii

- Previous project demonstrated using DNA microsatellites and morphological methods that there is only one subspecies of *Quelea quelea* in southern Africa (Martin Dallimer 2001 PhD thesis, Univ of Edinburgh; Jones *et al.* 2002 *Ostrich* 73: 36-42.)
- One inter-breeding population
- WNW-ESE orientation behaviour (Dallimer & Jones 2002. *J.Av.Biol*. 33: 89-94.)
- Male-biased dispersal patterns (Dallimer *et al*. 2002. *Mol.Ecol*. 11: 529-533)

Slide 24

Medium Term Predictions

- No clear associations with ENSO events
- Some evidence of effect of December rainfall
- Some evidence of effect of February rainfall for Springbok flats
- Some evidence of effects of lags with significant autocorrelations up to 3 years

Slide 25

Model Algorithms

- **SHORT-TERM PREDICTIONS**
- *VERSION REQUIRING ONLY INFORMATION ON RAINFALL AS REAL-TIME INPUTS*
- Spatial Scale: Degree square level initially.
- Time steps: 1 week.
- Start of System: September (week 36)

Slide 26

Model Algorithms

- *Probability of breeding based on*:
  (1) History of quelea breeding in square.
  (2) History of rainfall in the square.
  What was total rainfall for current week?
  What was total rainfall for current week plus previous week?
  What was total rainfall for current week plus previous 4 weeks?

Slide 27

Algorithm for Initiation of Early Rains Migration

- IF total rainfall for current week in a particular square OR total rainfall for current week plus previous week in a particular square > 60mm, THEN season starts in that square, as early rains migration stimulated, and breeding cannot begin until 6 weeks have elapsed.

Slide 28

Evidence for the 60mm threshold for Start of Early Rains Migration

Taxon	Country	Site	Date	Rainfall (mm)	Source
Q. q. lathamii	Botswana	Samedupi	November 1971	66.5	Ward & Jones (1977)
Q. q. intermedia	Tanzania	Arusha	November 1969	69.0	Ward & Jones (1977)
Q. q. intermedia	Tanzania	Makuyuni	Nov/Dec 1970	68	Ward & Jones (1977)
Q. q. lathamii	Zimbabwe	Bulawayo	23 November 1997	67	This report
Q. q. lathamii	Zimbabwe	Norton	18-19 November 1998	61.9	Dallimer (2001)

Slide 29

Model Algorithms

- IF > 6 weeks have elapsed since season started in a square AND total rainfall for current week plus previous 4 weeks in that square > 250mm THEN breeding possible in that square.

Slide 30

Model Algorithms

- WHEN breeding started quelea will remain in square for 6 weeks (5 weeks breeding, 1 week post-breeding recovery to regain condition).
- 4 weeks AFTER breeding has begun in a square, it will cease to be suitable for breeding.

Slide 31

Model Algorithms

- WHEN all squares have achieved the 250mm threshold AND 5 weeks have elapsed since that time, the system stops as there will be no further squares available to become suitable and all previously-suitable ones are no longer suitable.

Slide 32

RAINFALL

- Estimated from1 hour Cold Cloud Duration (CCD) equivalent to 3.0mm of rain.

Slide 33

Model run: GPI rainfall estimate:

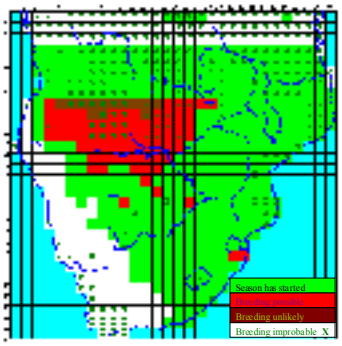
- The initial model used thresholds of 60mm and 300mm of rainfall for changes of state.
- For the initial run of the model rainfall was estimated by equating 1hour of cold cloud to 2.5mm of rain (Tanzania experience).
- Latest version of the model estimates the rainfall by equating 1hour of cold cloud to 3.0mm of rain (GOES Precipitation Index) and uses 250mm of rainfall as the threshold for possible breeding.

Slide 34

LEGEND

- No activity yet - White
- Season has started - GREEN
- Breeding possible - RED
- Breeding now very unlikely- BROWN
- X - Square where there have been no records of any sort of *Q. q. lathamii*

Slide 35



Week 14 Week ending: Sunday 23rd December

Slide 36

Validation?

- Current season's data-set still very incomplete but we know that there were colonies in:

Botswana in January (Serowe district) and in 23S25E (Red)

Mozambique in February at Cocovela, Phamphanpha, Duvane and Conhane in the Chokwe District (Gaza Province).

South Africa in February 32 colonies mainly in the northern part of the Free State Province and central areas of the Northern Province (Springbok Flats).

Slide 37

Future Plans

- Validation for 2001/2002
- Validate with rainfall and *Quelea* data for 1999/2000 and 2000/2001
- Improve resolution to 0.25 degree squares
- Investigate value of NDVI as check on rainfall
- Include current year *Quelea* data if reported soon enough
- Vary rainfall interpretations and breeding probabilities according to location

Slide 38

Future Plans

- Provide weekly forecasts for ICOSAMP in 2002/2003
- Develop user-friendly version for local use with local satellite data capture if possible

ICOSAMP OUTPUTS AND PROGRESS TO DATE

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INTRODUCTION

The ICOSAMP project (funded by DFID), initiated on 1st January 2001 and Phase I due to end on 31st December 2002, has been successful in bringing together collaborators in 11 SADC countries (Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe), as well as fostering a close liaison with IRLCO-CSA (International Red Locust Control Organisation for Central and Southern Africa) and the SADC Crop Sector.

The ARC-PPRI (M Kieser) is responsible for the co-ordination of the project, development and maintenance of the website, and issuing of monthly Bulletins. NRI, UK (J Pender) is responsible for the development and update of the GIS viewer and the databases.

OUTPUTS

Three outputs are identified in the project memorandum:

1. Creation of migrant pest information databases,
2. Automated information system (website and Access),
3. Quarterly Migrant Pest Bulletins.

Under each of these outputs various activities were planned and details of timescale and status of completion are provided in Table 12.

Table 12. ICOSAMP outputs and activities and progress to date

ACTIVITY	PERIOD	STATUS
Output 1: Migrant pest information databases		
1.1 Establish a communication network of SADC collaborators	Jan.2001 →	Ongoing
1.2 Collate reporting methods in the Region	Jan-Apr 2001	Completed
1.3 Workshop to determine: needs of system, establish standardized reporting methods, define lines of communication, and establish reporting dates	May 2001	
1.4 Determine structure of databases and assemble data	Jan.-July 2001	Completed
Output 2: Development of automated system		
2.1 Design information system	Mar-Aug.2001	Completed
2.2 Establish email forum and maintain	Mar.2001 →	Ongoing
2.3 Website operational and updated	Mar.2001 →	Ongoing
2.4 Determine outputs and design GIS maps	Apr.-Aug.2001	Completed
2.5 Design and maintain GIS viewer and databases	May 2001 →	Ongoing
2.6 Workshop to : 1). Provide training on system 2). Evaluate progress and 3). Establish future pathways	May 2002	**THIS workshop**
2.7 Develop dissemination pathways and methods	Apr.-May 2001	Completed
2.8 Information system complete	Oct.-Dec.2002	Dec.2002
2.9 Assess future sustainability	Oct.-Dec.2002	Dec.2002
2.10 Marketing of system to media	Oct-Dec.2002	Dec.2002
Output 3: Migrant Pest Bulletins issued		
3.1 Issue Bulletins via website, email, fax	Monthly	Ongoing

ACHIEVEMENTS OF ICOSAMP

ICOSAMP has, since its' inception in January 2001, earned a number of achievements namely:

1. **The SADC migrant pest reporting network has been "re-instated".** The previous reporting network fell away in 1997 after the demise of the Southern African Regional Commission for the Conservation and Utilisation of Soil (SARCCUS) and the incorporation of their mandate into the SADC structure.
2. **The ICOSAMP email network is attracting interest** from inside AND outside the SADC region, including researchers from the USA and Australia.
3. The monthly bulletin - **"ICOSAMP News"** – provides an up-to-date 'picture' of the migrant pest activity in the region.
4. **Regular communication is maintained** between the Co-ordinator and the regional collaborators.
5. As a result of the liaison between ICOSAMP and the SADC Secretariat, **two full computer systems were promised** by SADC to the countries (Angola and Swaziland) lacking the technology needed to function efficiently in ICOSAMP.

COMMENTS

Although some teething problems have arisen (Table 13), we have managed to overcome them through determination and dedication to the purpose of ICOSAMP namely to:

"... establish an internet-based migrant pest information centre for the SADC region which will provide a platform for technical co-operation and sharing of research information, establish a network of control operators, and standardise the regional reporting system .... and thus safeguarding the food security of the region."

Table.13. Problems experienced and solutions found since inception of ICOSAMP

PROBLEM	SOLUTION
Two countries lack direct access to computer technology	After the first Workshop (May 2001), liaison between the SADC Secretariat and the ICOSAMP co-ordinator resulted in PC systems being promised to Angola and Swaziland.
Limited number of Countries submit monthly reports on a regular basis	Co-ordinator sends out reminders every month
Intellectual property rights enforcement from the RSA Dept. Agriculture	Official correspondence from SADC Secretariat and ARC-PPRI re provision of migrant pest information for ICOSAMP to benefit the region
Quarterly reports not received	Quarterly reporting discontinued: delegates agreed to monthly reporting in detailed format
Difficulty in finding a reliable internet service provider	Co-ordinator approached EcoPort (FAO) for affiliate membership and the website is hosted on the EcoPort site (no charge)
Email facility at ARC-PPRI unreliable	New email address provided by EcoPort

CONCLUSION

ICOSAMP has not only re-established a vital information service in the SADC region, but has opened the door for wider collaboration outside the region with international research and control organisations.

The system has unfortunately (or perhaps fortunately ??) not yet been "tested" during a regional migrant pest crisis, but we should nevertheless continue to build and maintain our network of communication and collaboration, as this will enable us to foresee any problematic areas and react accordingly.

Dr Sutherland explaining the evaluation procedure to delegates

THE ICOSAMP DATABASE AND GIS VIEWER

Judith Pender
7 Beverley Close, Rainham, Gillingham, Kent ME8 9HG, UK
(email: judithpender@hotmail.com)

Editors' Note: *Screendumps of Mrs Pender's presentation are provided below.*

The main objective of ICOSAMP is to provide a forum for the exchange of information on the status and movement of migrant pests in the countries of Southern Africa. The main means for doing this is the dissemination of a monthly bulletin and map.

In order to support these objectives and to provide a working prototype for a web based information system a computer-based information system has been constructed. The system has two main parts, a relational database based on Access 2000 and a geographical information system (GIS) based on Arcview 3.2x.

The system is driven through the GIS where buttons and menu items allow the input of pest and related ecological data into the database as well as additions to a bibliography and information about individual countries.

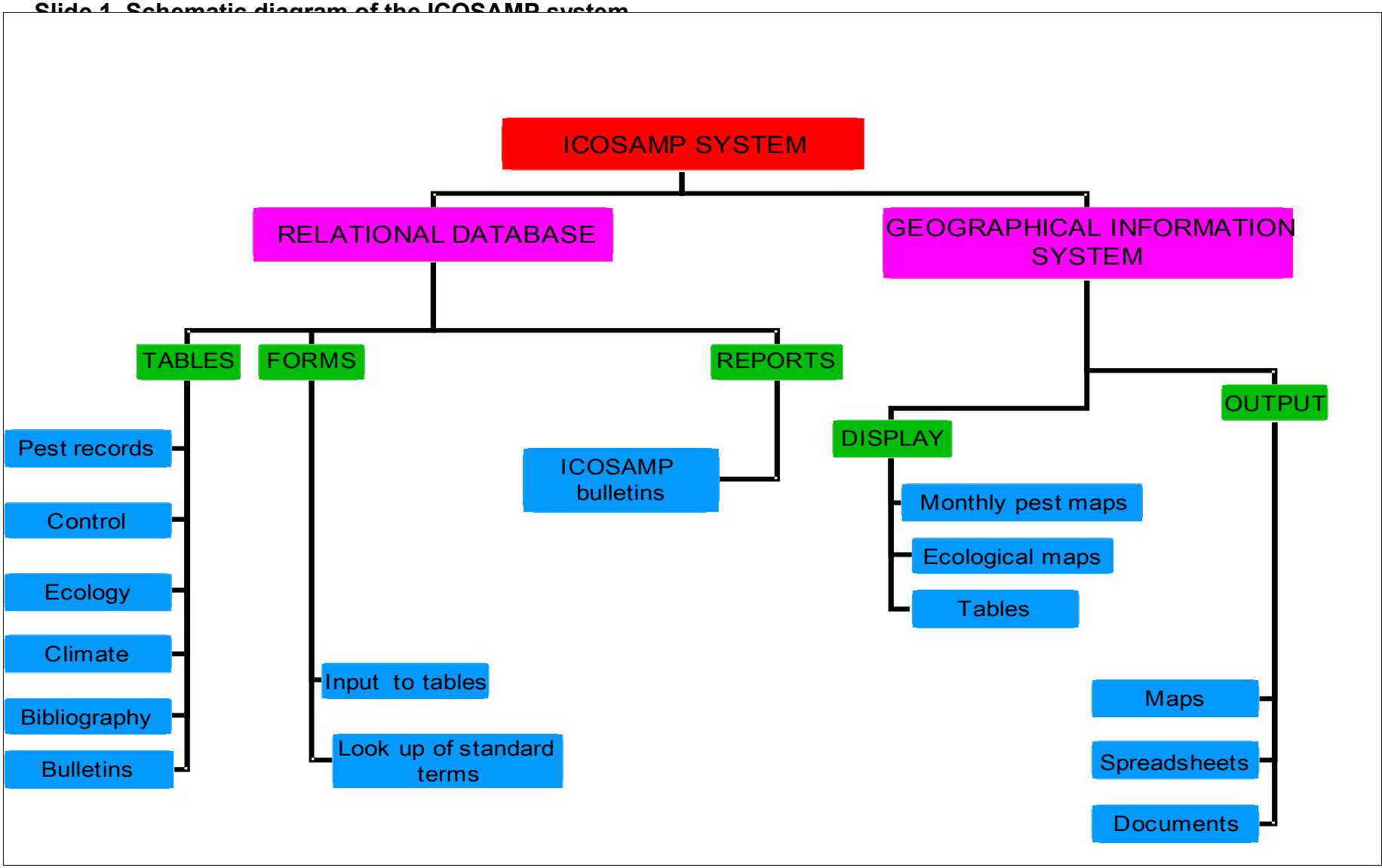
Monthly maps of all three pest groups (locusts, armyworm and quelea birds) are constructed with ease, and information on environmental and control data can be added. This gives rapid access to the data collected since the beginning of ICOSAMP as well as the construction of a current map. A layout has been prepared for printed outputs of the maps, and tables of information can be exported into Excel, Dbase or text format.

The database also supports a standardised format for the production of the monthly bulletin and map.

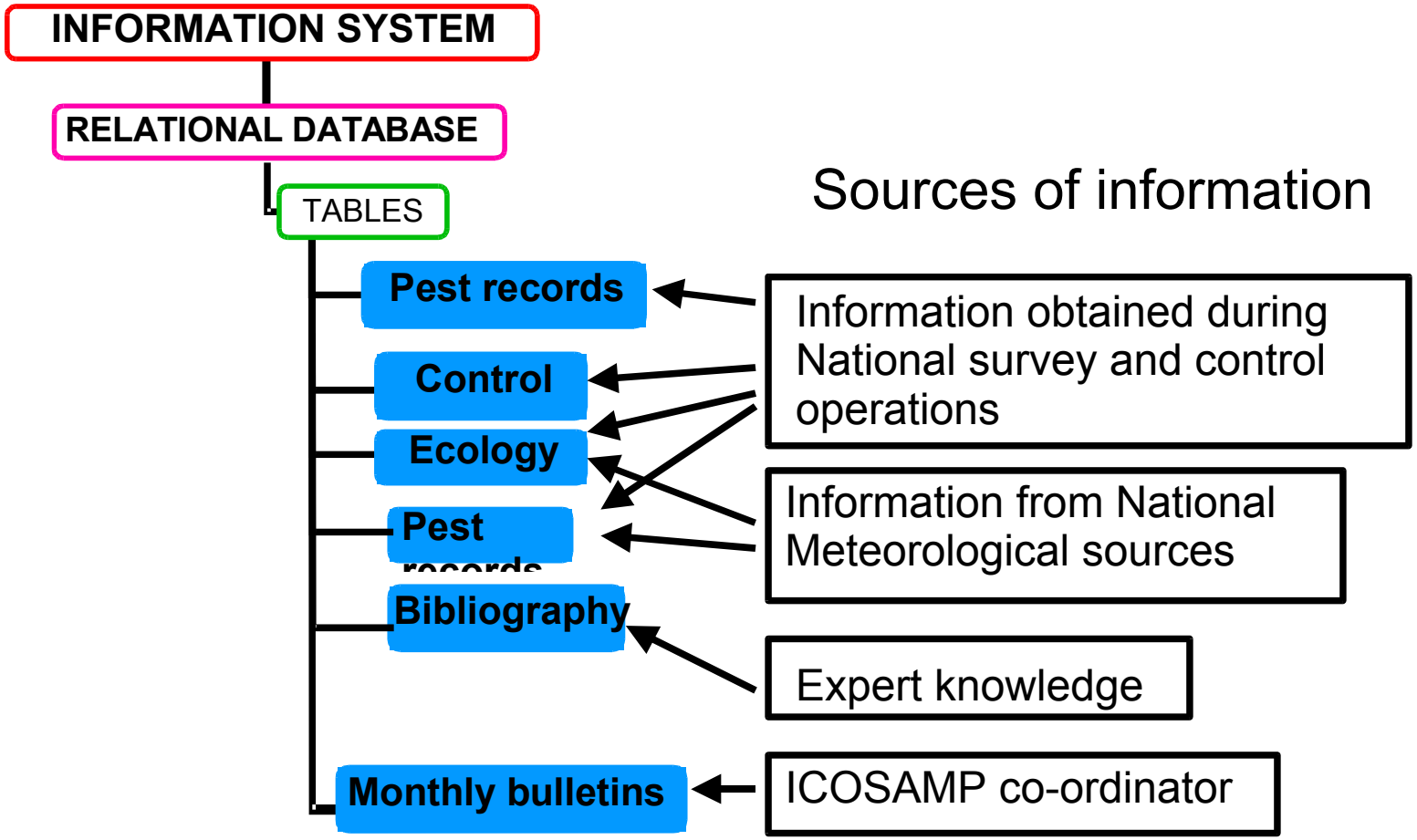
The next phase of development will to be to respond to comments and suggestions of the workshop participants and then transfer the whole package to a working web site.

A schematic diagram of the ICOSAMP system is provided in Slide 1.

Slide 1. Schematic diagram of the ICOSAMP system



Relational database tables



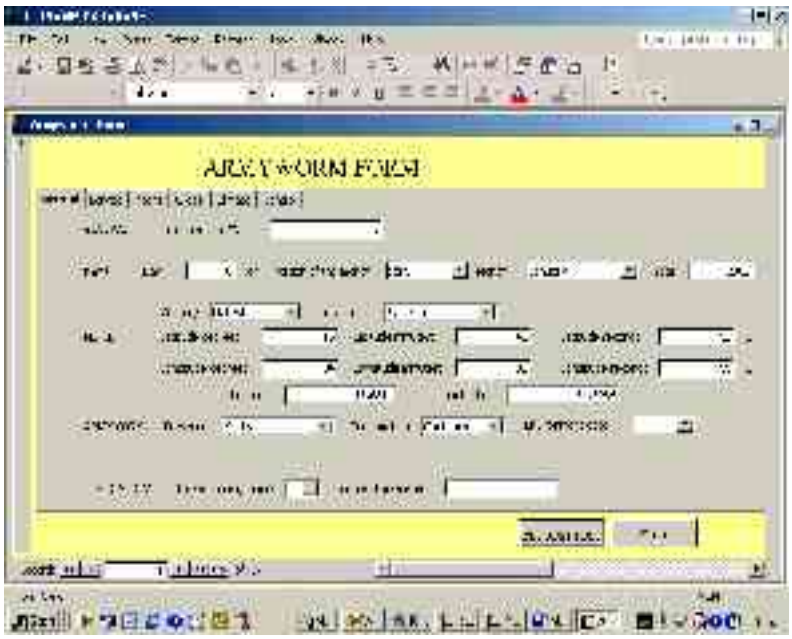
Slide 3

Relational database forms

- Information is added using forms on the computer screen
- "Look up lists" standardise terminology– this allows information to be found and retrieved quickly

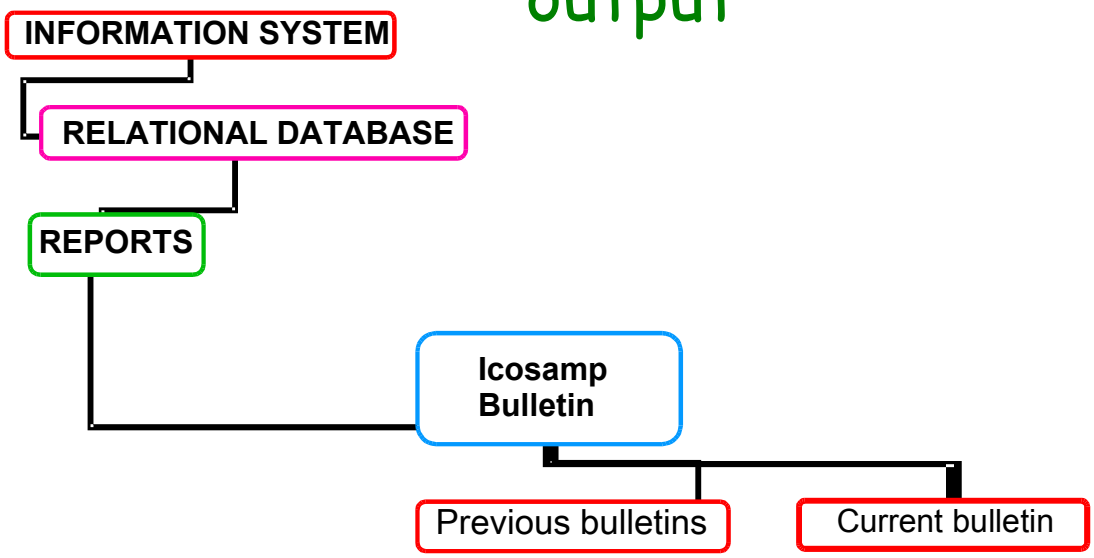
Slide 4

Entry form example - Armyworm



Slide 5

Examples of relational database output



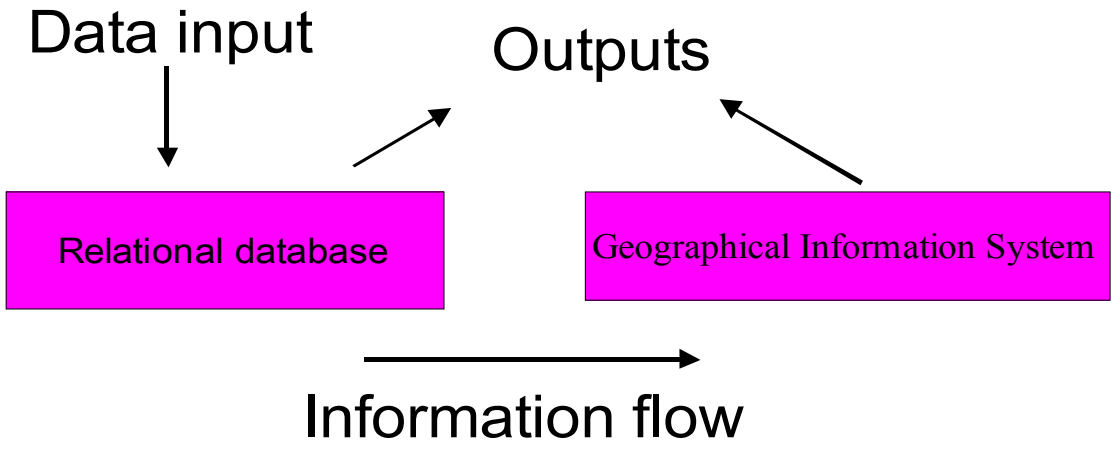
Slide 6

Relational database outputs

- Many outputs are possible from the database
- Participants are invited to suggest outputs they would use in their work

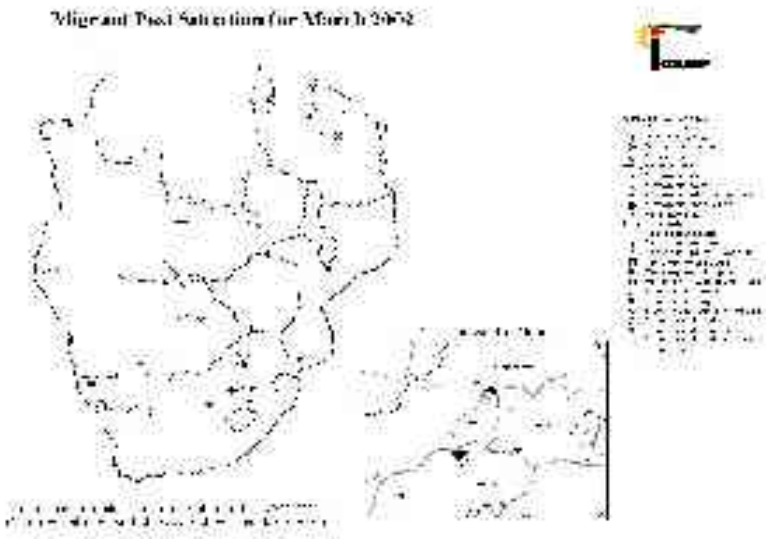
Slide 7

Information is input into the database and passed to the GIS for display and analysis



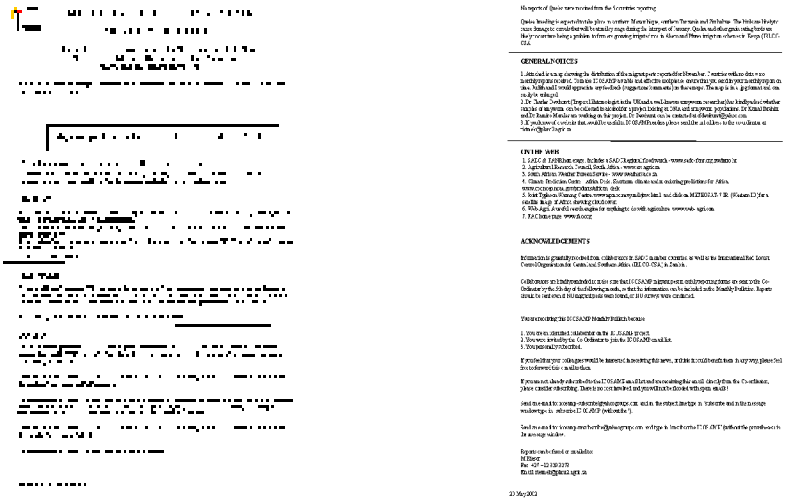
Slide 8

ICOSAMP information system (1)- monthly map



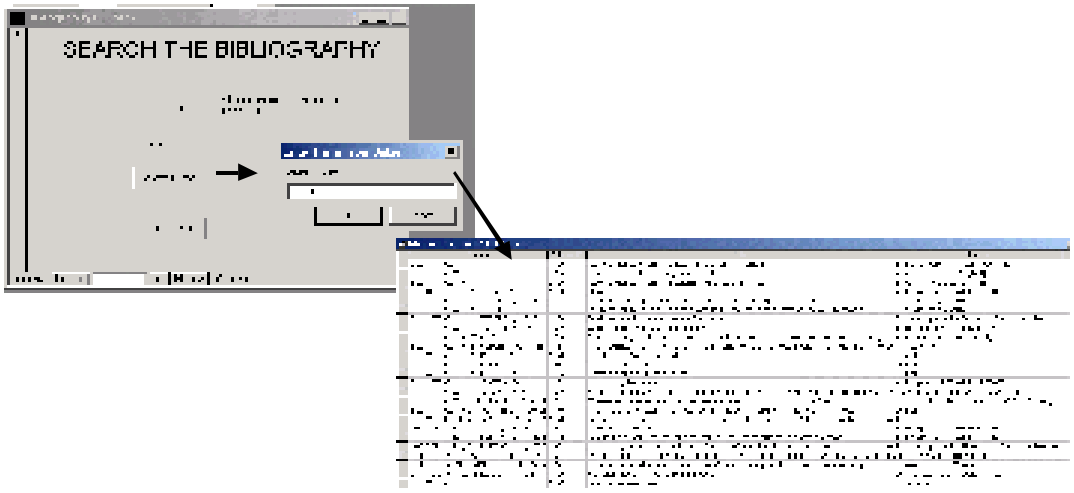
Slide 9

ICOSAMP information system (2) – monthly bulletin



Slide 10

ICOSAMP information system (3) – bibliographic search



EVALUATION SESSION 1
Evaluation of the "Usability" of the prototype ICOSAMP website
M Kieser

Each delegate was provided with access to a computer at the ARC Corporate offices for the express purpose of evaluating the "Usability" of the prototype website. As the ICOSAMP co-ordinator did not want to influence the results of the evaluation, delegates were only given a brief explanation of the questions on the evaluation sheet (Table 14), and then asked to find the answers by browsing through the website.

USABILITY is defined as …
"*A quantitative or qualitative measure of the effectiveness, efficiency and satisfaction with which specified users can perform specified tasks in defined contexts.*"

> **"If the user can't use it, it doesn't work!**
> *Dr Susan Dray*

(*Editor's note: The knowledge and skills obtained by the Co-ordinator during a "Human-Computer Interaction and Usability" course attended in May 2002, were applied during these evaluation sessions.)*

Table 14. ICOSAMP website Usability evaluation sheet

ICOSAMP WEBSITE USABILITY EVALUATION
(http://icosamp.ecoport.org)

This checklist invites you to evaluate a website under different sets of criteria. Each criteria should be allocated a score out of 5 where 0 is not available at all, and 5 is extremely well presented. Certain criteria may not currently be available eg. URL, please therefore score it as a 0.

PLEASE MARK BLOCKS WITH AN "X"

Adding up the scores at the end of the usability evaluation will give a 'rough' indication of the effectiveness and usefulness of the website. The results will also highlight areas that require attention.

GENERAL INFORMATION OF USER		
Gender?	Male	Female
1. Are you a regular user of the internet and websites?	Yes	No
2. What do you use the www for?		
a. as a search facility?	Yes	No
b. for personal interest/hobbies?	Yes	No
3. Are you familiar with website terminology eg. "Site map; links"?	Yes	No
4. Do you know how to use a 'Search Engine'?	Yes	No

CRITERIA	SCORE					
1. FIRST IMPRESSIONS	**0**	**1**	**2**	**3**	**4**	**5**
1.1 Easy to remember the URL (= website address)						
1.2 Design is pleasing to the eye						
1.3 Home Page fits on one screen						
1.4 Unique Selling Point (USP) visible on Home Page						
1.5 Depth of site (feeling of wanting more)						
1.6 Ability to open other pages from Home Page						
Total score for section 1						

CRITERIA	SCORE					
2. DESIGN AND LAYOUT	**0**	**1**	**2**	**3**	**4**	**5**
2.1 Consistent look/feel to the website						
2.2 Clutter of design						
2.3 Legibility of text (size, colour, font)						
2.4 Width of text visible on screen						
2.5 Acceptability of colours used on website						
2.6 Accuracy of spelling and grammar						
2.7 Use of images, pictures						
Total score for section 2						

CRITERIA	SCORE					
3. NAVIGATION	**0**	**1**	**2**	**3**	**4**	**5**
3.1 Ease of use						
3.2 Navigation ability						
3.3 Return to Home Page from any page						
3.4 Internal search engine available						
3.5 Links work						
3.6 Links clear (give what you expected)						
3.7 ALT tags (on images) available						
Total score for section 3						

CRITERIA	SCORE					
4. CONTENT	**0**	**1**	**2**	**3**	**4**	**5**
4.1 Targeted audience						
4.2 Depth of information						
4.3 Up-to-date information						
4.4 External links						
4.5 Partner and affiliate sites						
4.6 FAQ’s						
4.7 Useful graphics						
4.8 Contact details						
Total score for section 4						

CRITERIA	SCORE

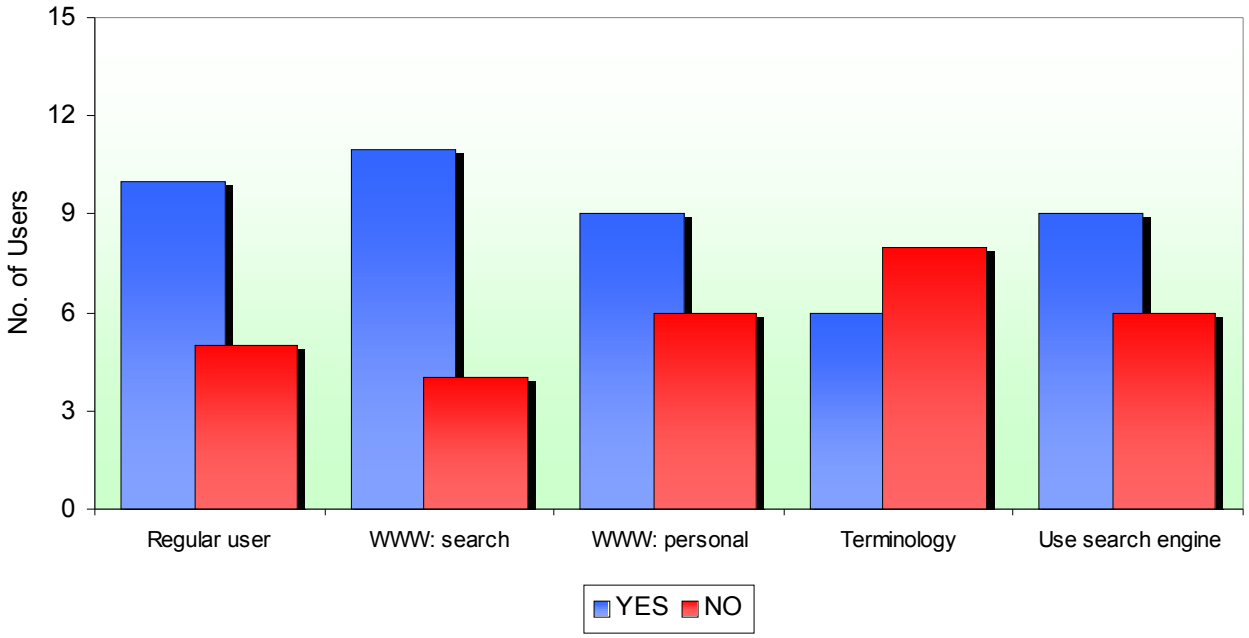
5. USER SATISFACTION	0	1	2	3	4	5
5.1 Email links available						
5.2 Email discussion forum						
5.3 Clicks to completion (5 clicks = bad)						
Total score for section 5						

The results of the questionnaires, summarised in Figs.6-11, were analysed and presented by the Co-ordinator at the plenary session on Thursday morning.

SUMMARY OF ICOSAMP WEBSITE EVALUATION RESULTS

Fig.6. General information of User

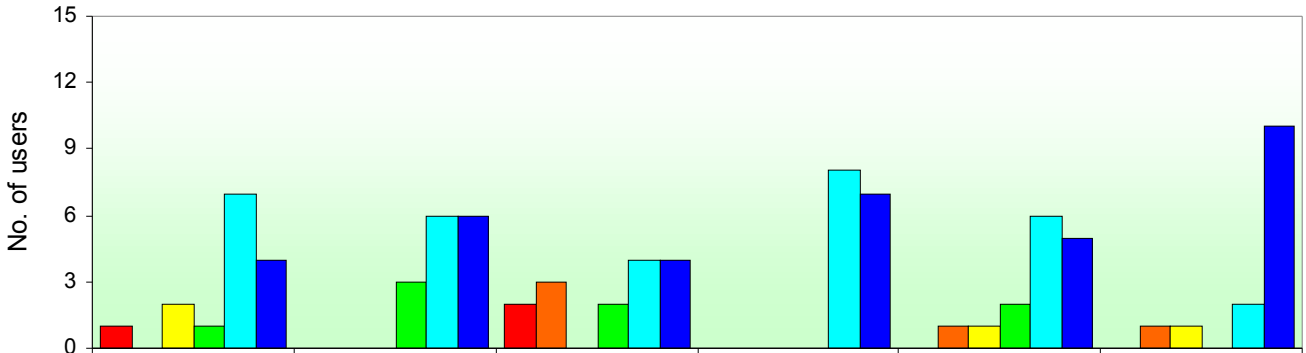
The gender composition consisted of 11 men and 4 women. Although the majority of the delegates were at ease with the general use of the world wide web, many did not understand common computer terminology.



The data in the following Figs. 7-11 reflect the 'score' allocated by delegates to the various criteria, and conspicuous colours were used to highlight weaknesses (red) and strengths (dark blue). Data are also provided.

Fig. 7. First impressions of the ICOSAMP website

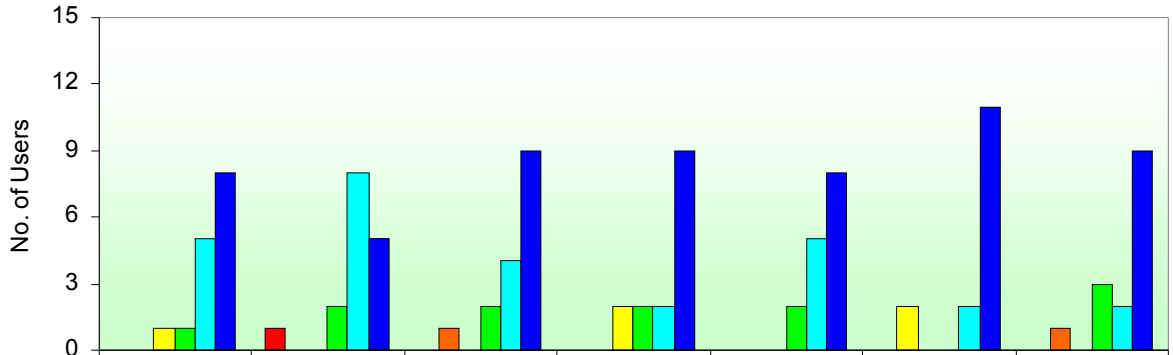
Results indicate that delegates were satisfied with the first impressions created by the website, but that more information was desired eg. life-cycles of the pest species. However, delegates accepted the explanation that the website being evaluated was the prototype version and that development would continue on a regular basis.



	Easy URL	Design	Home page	USP	Depth	Other pages
0	1		2			
1			3		1	1
2	2				1	1
3	1	3	2		2	
4	7	6	4	8	6	2
5	4	6	4	7	5	10

Fig. 8. Design and Layout of the ICOSAMP website

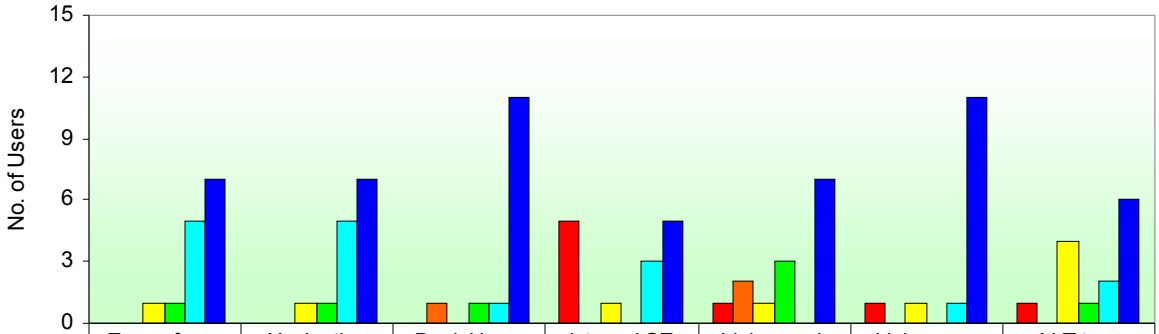
More than 90% of the results indicate an above average satisfaction with the design and layout of the website. The one or two minor problems areas that arose were dealt with during the discussion at the evaluation session.



	Consistency	Clutter	Legibility	Screen fit	Colour	Spelling	Images
0		1					
1			1			2	1
2	1			2			
3	1	2	2	2	2		3
4	5	8	4	2	5	2	2
5	8	5	9	9	8	11	9

Fig. 9. Navigation of ICOSAMP website

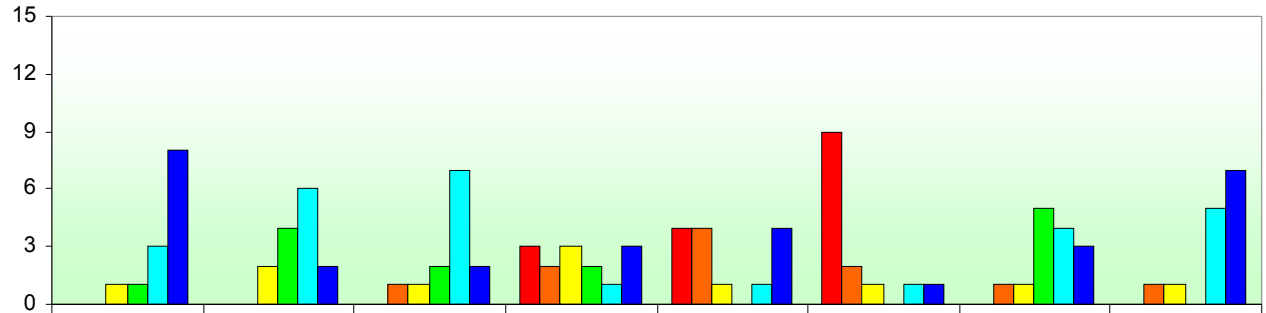
The questions relating to the navigation in the website required a moderate knowledge of website browsing (eg. ALT tags) and as some of the delegates were unfamiliar with the terminology and English is not their first language, some of these results are not entirely accurate. For example, they were required to find an 'internal search engine' – which the co-ordinator knew for a fact did NOT exist, hence the irregular answers. Assistance was provided during the evaluation for explanation of the terminology, but delegates were still required to find the answers themselves.



	Ease of use	Navigation	Back Home	Internal SE	Links w ork	Links easy	ALT tags
0				5	1	1	1
1			1		2		
2	1	1		1	1	1	4
3	1	1	1		3		1
4	5	5	1	3		1	2
5	7	7	11	5	7	11	6

Fig. 10. Content of ICOSAMP website

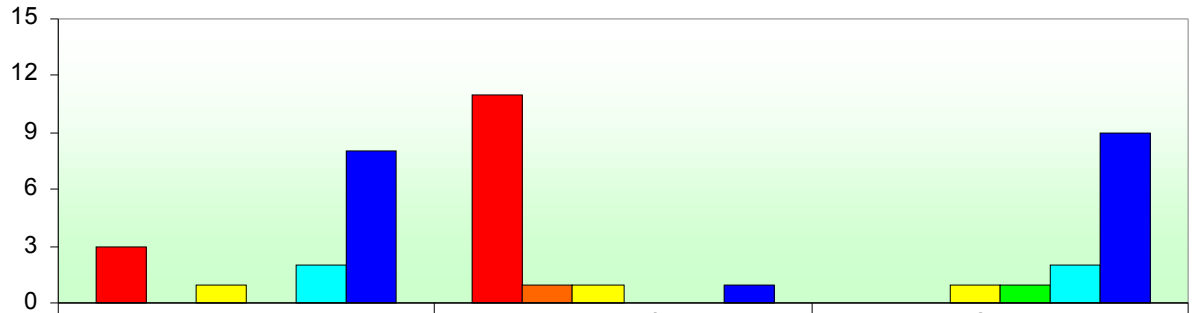
Fairly accurate results were obtained in this section, indicating that the majority of delegates were able to find (or not find) the required answers. The indication of the red bars (negative) under 'Affiliate sites' and 'FAQs' is correct, as the co-ordinator had *intentionally* included these two questions, knowing full well that these pages were not yet available on the website.



	Target	Depth	Up-to-date	External links	Affiliate sites	FAQ's	Graphics	Contacts
0				3	4	9		
1			1	2	4	2	1	1
2	1	2	1	3	1	1	1	1
3	1	4	2	2			5	
4	3	6	7	1	1	1	4	5
5	8	2	2	3	4	1	3	7

Fig. 11. User satisfaction of ICOSAMP website

Satisfaction measures the comfort and positive attitude towards the use of a website. The co-ordinator again *intentionally* asked delegates to find an aspect of the website that was not yet available eg. the Discussion Forum. The majority of the delegates were satisfied with the email links provided and the limited number of "mouse clicks" needed to access information.



	Email links	Discussion forum	Clicks
0	3	11	
1		1	
2	1	1	1
3			1
4	2		2
5	8	1	9

EVALUATION SESSION 2
Evaluation of the ICOSAMP database and GIS viewer
J Pender

Each delegate was provided with access to a computer at the ARC Corporate offices for the express purpose of evaluating the ICOSAMP database and the GIS viewer. Guidance was provided on the evaluations sheet and delegates were then asked to test the system by inputting data from copies of their last monthly reports. Evaluation sheets were also completed (Table 15).

Table 15. Evaluation of ICOSAMP Database and GIS viewer

Name: _____

Organisation: _____

Please comment of the following

DATABASE

Pest Input Forms

1. Are the forms easy to use? Comment.

2. Is the pest information (circle your choice)

a). About right? Y / N

b). Too many fields? Y / N

c). Too few fields? Y / N

3. If you would like less information collected, which information is not needed or collected?

4. What additional information should be included?

5. Comments on other input sheets – gazetteer, background map data, bibliography, bulletin

6. Comments on overall appearance

Database reports

7. At the moment the only reports automatically generated are monthly bulletins. Would you like other reports eg. results of bibliographic searches? If so, which data would you like? (Remember, tables of original data are output in the GIS)

GIS VIEWER

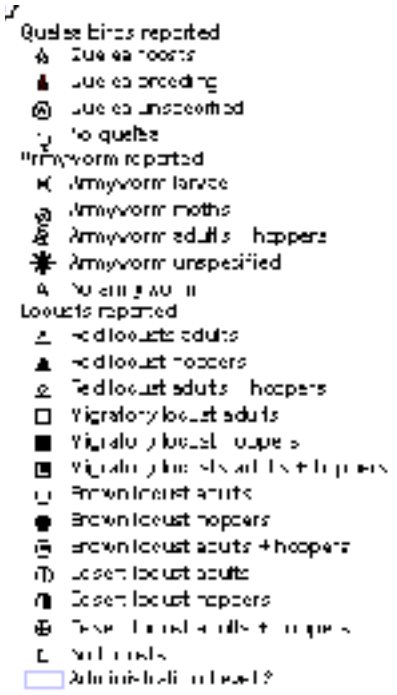
1. What is your impression of the overall look of the viewer, bearing in mind the buttons and menus specific to ICOSAMP.

2. Please comment on the ease of moving between the GIS and database (i.e. input and searching)

3. Comment on the symbolisation of the pest data. Are the number of symbols … (circle choice)

a). About right? Y / N
b). Too many? Y / N
c). Too few? Y / N
d). Are they confusing? Y / N
e). Would you like coloured symbols? Y / N

Please suggest alterations to the symbols (list of current symbols)



4. Comments about producing maps on screens.

5. Comments about non-pest data on the maps.

6. Is there any other data you would like mapped?

7. Any comments on the printed map template?

8. Comments on the output tables.

9. Would you like control over the fields exported? Y / N

10. Any other comments and wishes about the ICOSAMP database and viewer.

Editor's Note: A summary of the comments made by participants from the evaluation sheets was not available at time of workshop closure, and are therefore provided below.

SUMMARY OF DATABASE AND GIS VIEWER EVALUATION RESULTS

DATABASE

1. **Are the forms easy to use?**

Majority of comments were positive. Assistance in the form of a 'help' dropdown box or manual was requested for completion of the fields.

2. **Pest information content.**

Participants were happy with the number of input fields. The number of red locust hopper instars was queried.

3. **Information not needed?**

Participants stated that the more information collected, the more comprehensive the database would become.

4. **Additional information needed?**

4.1 Ability to input farm names.
4.2 Wind speed and wind direction information on the climate form.
4.3 Creation of drop-down lists for vegetation types to prevent typing errors and to standardise on vegetation categories.
4.4 Input field for "control" or "observation" data.
4.5 Creation of drop-down list under Quelea for control methods, to include harvesting, chemical and explosion.

5. **Comments on other input forms.**

5.1 A "search" facility for the bibliography is needed.
5.2 Automatic input of co-ordinates into a field from the gazetteer is needed.

5.3 Printout facility for bibliography needed.

6. Overall appearance.

A positive feedback received.

7. Additional database reports preferred.

7.1 Summary of bibliography search
7.2 ALERT notifications.
7.3 Annual report format.

GIS VIEWER

1. Overall impression of viewer.

Very good, neat and concise. A comment was made that as the requirements of the system change over time, the viewer will probably need adjustment as well.

2. Ease of movement between the database and the viewer.

Although only a few participants undertook this task, no negative feedback was received.

3. Comments on the symbols used.

3.1 All participants agreed that the quantity of symbols used was sufficient, but that the addition of coloured symbols could assist with easier identification of species and status.

4. Production of maps on computer screens.

There was a general agreement that the use of maps on a screen provides a powerful, quick and easy-to-use *visual* picture of the distribution of the pest, and highlights possible problem areas.

5. Comments on non-pest data on maps.

A request for rainfall maps was received.

6. Additional data which could be mapped?

6.1 Ecologically sensitive areas
6.2 Vegetation
6.3 Rodent control data.

7. Comments on the printed map template.

None received.

8. Comments on the output tables.

Good, acceptable.

9. Is operator control needed over the fields exported into the tables?

Participants agreed that a choice over the fields to be exported would be desirable.

10. Further comments on the ICOSAMP database and GIS viewer.

10.1 The system should be available in each country and training provided.
10.2 As the requirements of the system may change over time, it should be adaptable.

Co-ordinator's comments: The comments above will be taken into consideration and, where possible, applied and the system revised.

EVALUATION SESSION 3
Evaluation of the ICOSAMP and QUELEA Projects

A Sutherland
Natural Resources Institute, Livelihoods and Institutions group, University of Greenwich, Chatham Maritime, Kent ME4 4TB, UK (email: A.J.Sutherland@greenwich.ac.uk)

Editors' note: Dr Sutherland was invited to attend the Workshop on behalf of NRIL and the client (DFID) to evaluate both the Quelea and ICOSAMP projects.

GENERAL MONITORING AND EVALUATION (M&E) OBJECTIVES AND APPROACH

M&E Objectives

1. To promote learning among ICOSAMP members about how the project has gone so far, in order to guide implementation to the end of the project, and beyond,
2. To stimulate thinking about how useful the initiative is, how to sustain the useful aspects, and how to continue to monitor and evaluate its effectiveness,
3. To assess the relevance and role of pest forecasting models (quelea case) for ICOSAMP
4. To generate learning points that might be transferred to other similar initiatives, by the DFID Crop Protection Programme, or other agencies.
5. To identify the pathway/s whereby the project will impact poverty - via intermediate agencies.

M&E Approach in the workshop

- Promote discussion and understanding of the issues/evaluation questions,
- Promote openness, and frank dialogue, constructive criticism.
- Get perspectives from individual countries,
- Provide prompt feedback to key actors in the project

Editor's note: Each delegate was given an evaluation questionnaire on the first day of the workshop (Tuesday), to complete and return on Wednesday evening.

ICOSAMP EVALUATION QUESTIONS

Two sets of questions were posed:-

1. Questions relating to the 3 main outputs of ICOSAMP

- Database inputs and email forum,
- monthly bulletins,
- web-based information system (Thursday morning).
  (this includes two evaluation questionnaires linked to the training on Wednesday)

2. Questions relating to broader and cross-cutting issues

- quality of key information inputs - from the field and from research (e.g. Quelea model),
- a key output -warning forecasts.

1. QUESTIONS RELATING TO 3 OUTPUTS OF ICOSAMP

Assumption

A review of the experience to date, by the main project actors will help the project in delivering the intended outputs in a format that better meet their needs, and the needs of the countries/ organisations they represent?

The regional control operators will have a different perspective and concerns from the principal investigator/s, hence some questions are different.

1.1 Migrant pest data-base inputs & email forum

Questions to regional control operators

1.1.2 What has been your experience so far with completion of monthly and quarterly reports:-

Monthly reports:
Positive experiences/benefits
Negative experiences
Other issues
Implications for ICOSAMP

Quarterly reports:
Positive experiences/benefits
Negative experiences
Other issues
Implications for ICOSAMP

1.1.3 What has been your experience so far with the email forum:-
Positive experiences/benefits
Negative experiences
Other issues
Implications for ICOSAMP

Questions to principal investigator/s

1.1.4. What has been your experience (positive, negative, other issues) so far with :-
Monthly reports
Quarterly reports
Email forum
Other aspects of ICOSAMP
Implications for ICOSAMP

1.2 Bulletins from ICOSAMP

Regional control operators

1.2.1 Have you received the monthly bulletins regularly?
1.2.2 What have you liked about the bulletins?
1.2.3 How have you used the bulletins in your work?
1.2.4 Suggestions for improving the bulletins
Other comments on the bulletins

Principal Investigator

1.2.5 What challenges have you faced in compiling the monthly bulletins?
1.2.6 How have these been overcome?
1.2.7 What feedback have you had so far on the bulletins?
1.2.8 How have you used this feedback?
1.2.9 What has been the demand for the bulletins beyond the ICOSAMP core members?
Other comments on the bulletins

1.3 Web-based information system (after the training session)

Editors' note: The information system was evaluated during the training session and results are available on page 79 .

2. BROADER QUESTIONS ON ICOSAMP

2.1 Field based information quality

Assumption

The usefulness of the information system will be affected by the quality of the information inputted: "garbage in garbage out " principle.

Questions

2.1.1 What is the regional control operators assessment of the reports they receive from "the field" in terms of:-

- Pest outbreak report reliability (e.g. proportion of unreported outbreaks),
- Pest identification by field staff (are pests always correctly identified?),
- Timeliness of reports from field (time lags in reporting),
- Efficacy of any control measures used (measures of effectiveness),

2.1.2 What are the implications of this assessment for the regional information system?

(Editors' note: Questions 2.2.1 to 2.2.9 relate to the Quelea project and can be viewed on the following page)

2.3 Warnings/forecasting

Assumption
The most important service that ICOSAMP can provide is timely and accurate information across national borders, alerting advisory services and control units to risks of pest outbreaks.

Questions
2.3.1 What has been the past experience of issuing warning forecasts to neighbouring countries?
2.3.2 What has been experience of receiving these forecasts from a neighbouring country?
2.3.3 What guidelines (e.g. thresholds etc) exist for interpretation of data as a basis for making warning forecasts for:-

- quelea
- locusts
- army worm

2.3.4 What guidelines are there for transmitting warnings (e.g past precedents, national guidelines, regional co-operation agreements and guidelines provided by this project)?
2.3.5 Does the ICOSAMP project need to do anything more than what is planned in relation to warning forecasts?

2.2 QUELEA FORECASTING MODEL & E.I. EVALUATION QUESTIONS

Assumption
Appropriate control strategies and effective advanced warning systems will depend on adequate and up to date technical information and usable models supplied by research agencies.

Please draw a circle around the answer relevant to your situation.

Regional interests
2.2.1 How important is quelea control in your country? Very, Moderate, Minor, Not at all.

If "not at all", do not proceed to other questions.

Usefulness questions
Environmental Impact
2.2.2 How useful are the environmental impact research review outputs in terms of:-

a) monitoring environmental impact on non-target organisms in your country - Very, moderately, a little, not at all (Explain answer)
b) for developing standard procedures for monitoring E.I. Very, moderately, a little, not at all (Explain answer)
c) monitoring other types of impact arising from control (e.g. human health and nutrition)? Very, moderately, a little, not at all (Explain answer)

The Model

2.2.3 Based on your current understanding, how useful could the quelea model be in terms of planning your monitoring and control operations within your country?
Very, moderately, little, not at all (Explain answer)

2.2.4 How useful could the model be for forecasting and giving advice on risk reduction strategies for farmers within your country?
Very, moderately, little, not at all (Explain answer)

2.2.5 How useful could the model be for providing warning forecasts across national borders?
Very, moderately, little, not at all (Explain answer)

2.2.6 What decisions would you expect the model to help you to make (list as many as you like)?

2.2.7 What are your suggestions for improvements to the model, to make it more useful?

Model Validation questions

2.2.8 What suggestions do you have for validating the quelea model through ICOSAMP?

2.2.9 If validated with the assistance of ICOSAMP, how in the future could the usefulness of the model be evaluated through ICOSAMP?

SUMMARY OF ICOSAMP EVALUATION RESULTS (compiled from completed forms)

1. Questions relating to the 3 main log-frame outputs of ICOSAMP

Views from regional control operators

Database inputs

Positive experiences

Input forms are easy to use by a range of staff.
The reporting process helps for mobilising monitoring officers instilling responsibility in them and provides a sense of importance / link to the outside world.
The co-ordinators get better information from the other countries.

Negative experiences

Reporting delays from the field.
Access to all the information needed (grid coordinates).
Reporting can clash with other activities.
Design of the quarterly reporting form, space for some entries and more detailed information on the location of outbreaks.
If no outbreaks, the reporting does not seem so relevant.

Other issues

Time constraints to complete all forms.
Some experience communications limitations.
Everyone has to participate for the system to be useful.

Implications for ICOSAMP
Complete and up-to-date information will depend on the reporting delays and communication problems being addressed in affected countries.
There may be a risk of duplication of data by having two types of forms.
Data entry forms are strategically crucial for the Bulletin

Email forum
Only two of the members reported as having signed up.

Positive experiences / benefits
Good for networking, share ideas, early warnings.

Negative experiences
Problems of easy access to email facilities.

Implications for ICOSAMP
Has the potential to strengthen the objective of information flow between country members involved in ICOSAMP as well as experts in related fields of expertise.

Monthly Bulletins
Only one delegate said they had not received these regularly.

Positive
Concise, informative about what is happening in neighbouring countries (outbreaks, extent of outbreaks, control measures used).

How Bulletins used in work
To get information on the movement of pests.
Forecasting an invasion across a national border.
Information in management of the pest.
Used the information in updated information / reports eg, quarterly, for submission to other interested / concerned parties.
Been alerted about outbreaks in other countries to be on guard for an outbreak in my country.
Circulated them and discussed them with colleagues.
Bulletins have been used to make people realise the activities/objectives of ICOSAMP, particularly field scouts and senior officers.
For training purposes, as literature review would be used for various purposes eg. studies from agricultural school.
To give to senior officers, to (help them) be aware of migratory pest issues.
Shared with my boss (Ministry).

Suggestions for improvement of Bulletins
Note all countries not sending in information.
Make room for related activities eg. date of outbreak, date control undertaken etc.
Include weather patterns.

Views from Principal investigator/s

Monthly reports

Positive
Most countries have been faithful in sending these every month.
The reports provide a 'quick' picture of the migrant pest situation.
Three emergency reports were received, transmitted to at risk countries, who all acknowledged receipt of them.

Negative
Not all partners submitted reports, and not all submitted them on time, so information incomplete and bulletins delayed.
Not always able to validate information if it is suspected to be incorrect (eg. species of locust).
Reporting period sometimes overlapped more than once calendar month and this has negative implications for data interpretation.

Quarterly reports

Positive
This form provides most of the pertinent and detailed information about each control action.

Negative
Since inception of the form in June 2001, three quarterly reports were due from each country. Only a few were received. As we all agreed to complete these forms, the percentage return is NOT indicative of our commitment.

Email forum
As mentioned at the workshop on Tuesday, there has been interest from outside parties – a good concept. However, except for RSA and Namibia, none of the other countries have subscribed, perhaps due to lack of information on the functioning of email forums?

2. Questions on broader and developmental issues

Views from regional control operators

Reliability of field reports
Some problems here and there but overall the information coming from the field is seen as reliable.

Reliability of pest identification
Mixed response, some are 100% and others have problems with reliable identification.

Timeliness of reports from the field
Mixed response, some are always on time but more appear to have delays in reporting.

Efficacy of control
Mixed response, with more reliability for Quelea than for other species reported.

Implications reported
Map image in the Bulletins will be incomplete in some respects.

Potential inputs from research – Quelea Model
Generally seen as a potentially useful model, with need for further refinement and validation.

Warning forecasts
Past experience of warning and forecasting has been mixed. Many have not had timely or reliable information, particularly after SARCCUS, but not everyone was clear about what SARCCUS did.
Very mixed experience of receiving warning forecasts from neighbouring countries, some rarely, others reliable.
Very few reported clear guidelines for interpretation of data as a basis for issuing warning forecasts for the three pests. A few had thresholds.
There are some established procedures for issuing warnings to other countries, but these appear to be variable and not to exist in some cases.

SUMMARY OF PLENARY SESSION 23 MAY 2002

Comments from delegates

1. The administration of any project which is endorsed by SADC and currently operating efficiently in another country (eg. ICOSAMP), will remain under the leadership of that Project Manager.
2. As a result of the establishment of ICOSAMP, a commitment has been leveraged from the Lesotho Government for the re-introduction of migrant pest monitoring in that country, and a team has been set up to undertake monitoring.
3. The monthly Bulletins issued by ICOSAMP are an excellent method of questioning 'suspect' reports emanating from the Region.
4. Reports received by Country collaborators should be verified BEFORE sending to the Project Co-ordinator for inclusion in the Bulletins.
5. A potential exists for the group to develop a sense of "what is good practice" to ensure that all activities undertaken by the ICOSAMP network are done well.
6. ARC-PPRI has committed Mrs Kieser to maintain the ICOSAMP network.
7. One of the possible additional outcomes from the project is "Capacity building" in each country.
8. Many delegates eluded to ICOSAMP as a possible tool for "building up an archive" of migrant pest information in the Region and providing early warning of impending outbreaks.
9. Collaborators now have something to report every month to their superiors – an objective not planned for in the Project Memorandum.
10. Countries will have access to their own valuable database of information which could probably form the basis for a future project to set up Country specific systems, and to this end each collaborator should find out what has already been done in their country with respect to establishing such a database.
11. Sustainability of the ICOSAMP project depends on each collaborator and is not the responsibility of the SADC Plant Protection sub-committee.
12. A report on the ICOSAMP workshop should be submitted to the next SADC Plant Protection Sub-committee meeting for evaluation.
13. The maps in the Bulletins are useful for providing an instant spatial illustration of the migrant pest situation in the region.

Decisions taken

1. The Quarterly reporting form is discontinued. Instead more detailed Monthly reporting forms for each pest will be used (Appendices 2-4). The previous Monthly summary form may only be used in the case of an emergency situation, or during a very busy control campaign, but must be followed up by the new detailed Monthly form.
1. Monthly reports are to be submitted by the **end of the 1st week** following the reporting month.
2. Mrs Sheila Machiri will include a clause in the Terms of Reference for the Migratory Pest Control Strategy for SADC, to undertake an audit of any "Country system information databases" currently being used.
3. Each country should establish a small budget to cover the costs of one delegate attending an annual meeting of ICOSAMP collaborators.
4. Each delegate should receive a commitment from their country that they are willing to sustain ICOSAMP.
5. Mrs Kieser and Mrs Pender to draw up a preliminary budget for the next phase of the project.

SPONSORS

The ICOSAMP Co-Ordinator wishes to thank the following Companies / Organisations for their generous donations.

1. **Agricultural Research Council (ARC)** for the bookmark calendars and Annual Reports (2000/2001).

2. **South African Tourist Bureau** for the desk calendars, CD pack, and Holiday Guides of South Africa.

ACKNOWLEDGEMENTS

We thank the donors, DFID, for agreeing to fund this project.

I would like to extend my personal thanks to Michelle and Angelo Dalporto of the SA Unplugged company, for their professional organisational services which contributed towards the success of the workshop.

A special word of thanks to Mr Paul Magnuson (ARC) for his excellent facilitation and to Ms Lianda Lötter for her efficient secretarial duties.

A final word of thanks to the Dimension Conference Centre for their hospitality and service.

MARGARET KIESER
Project Co-Ordinator

EXPLANATION OF THE ICOSAMP LOGO

Central to the whole goal of the ICOSAMP project is the "*Delivery of Information*" and this is depicted by the letter "**i**" which is the universal symbol for information.

The **dot** of the "i" is coloured red to emphasise it as the "CORE" of the information.

The **green wing** is a stylised locust wing.

The **yellow wing** is symbolic of both armyworm and Quelea flight movement, and 'cuts' into the letter "i" to show the relationship to the information system.

Design by Margaret Kieser, ARC-PPRI, Pretoria, South Africa

APPENDIX 1. FACILITATOR'S REPORT

Paul Magnuson
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This document presents a few thoughts on the ICOSAMP workshop, from my perspective as facilitator of some of the sessions. These perspectives are not necessarily very well informed, as I have not been an active participant in the ICOSAMP process in the year preceding this workshop. This document is designed as a report to the project team, as a supplement to the more formal workshop documentation being prepared.

Achievements over the past year

- The ICOSAMP network itself has been established. At least with respect to the ability to communicate effectively with the correct people in each SADC country, this alone is a great achievement.
- It is clear that at least some collaborators are strongly committed to the network. **In the case of Lesotho, this commitment had resulted in the re-instatement of their armyworm monitoring system.** This system had fallen away with the disintegration of the SARRCUS migratory pest network that had preceded ICOSAMP. If I understood correctly, what makes this achievement all the more impressive is that Lesotho has not experienced a significant armyworm problem for several decades – their commitment is therefore almost entirely an expression of commitment to the other SADC countries.
- The ICOSAMP communications system is operating effectively. All but one delegate at the meeting said that the information bulletins were received regularly from the co-ordinator. In the case of the one delegate who hadn't received the bulletins, this was because he had replaced the original collaborator (who had been receiving the bulletins), and the updated contact information hadn't been forwarded to the Co-ordinator.
- Very good progress has been made with the technical support systems underpinning ICOSAMP. Both the GIS and the web site are functional, and were subjected to a final scrutiny by the broader group of collaborators. Both systems were well received, although a few minor problems were identified. Once these have been resolved, both systems will be operationalised. The web site will be hosted on the EcoPort site.

Disappointments over the past year

- I feel that the network as a whole is still in "wheelbarrow mode" – it doesn't move unless it is pushed. There still seems to be an unhealthy over-reliance on external inputs from the ICOSAMP project implementation team, and a lack of collective ownership of the network by the various collaborators.
- This is evidenced by the relatively low priority apparently enjoyed by routine reporting from collaborators to the Co-ordinator. There is an intellectual understanding of the dependence of the network on this reporting, but this understanding has clearly not been translated into a firm resolve by most collaborators.
- More than once in the meeting, it was clear that at least some collaborators regarded ICOSAMP as a vehicle to appeal to the donor community to sponsor non-critical equipment (high-tech toys) such as GPS handsets and computers.

- Reservation was expressed by several collaborators that even were ICOSAMP to be fully operational, logistical and institutional problems might constrain effective control of a major outbreak of pests, at least in the less well-resourced countries. The appeal was therefore made to "ICOSAMP" to consider taking on the role of lobbyist with political groupings and donors.
- Neither of the two above comments necessarily indicate a problem. However, they are perhaps indicative of a perception that ICOSAMP has more to do with donors and other external stakeholders than with the group of people for and by whom it was developed, and who collectively embody ICOSAMP.

Overview of performance over the past year

- Representatives of the DFID Crop Protection Programme and of SADC management expressed the view that the shortcomings experienced were to be expected as the network members adjusted to the additional responsibilities imposed by the network. Their view was that ICOSAMP was perhaps overly critical of its own performance.
- The DFID Crop Protection Programme delegate responsible for the mid-term evaluation of ICOSAMP unofficially expressed satisfaction with what has been achieved to date.
- *The argument was made several times at the meeting that the ultimate demonstration of the value of ICOSAMP will not be known until there is a major outbreak of a migratory pest, requiring co-ordination of action by two or more countries.*

Future vision of the SADC project collaborators/beneficiaries

- The ICOSAMP collaborators once again expressed a clear commitment to rectifying the shortcomings of the network.
- **The collaborators expressed the view very strongly that ICOSAMP was of great value to them in meeting their primary responsibilities.**
- The collaborators expressed a commitment to ensuring that ICOSAMP be seen to be very successful in the period between now and the end of 2002, at which time DFID's agreement to provide financial support expires. This was to maximise the chance of attracting further support, to ensure that activities such as regular meetings of collaborators will be able to take place.
- Those collaborators that can possibly do so will try to become active participants in an ongoing electronic (email) discussion forum, to be hosted on Yahoo Groups. This should facilitate effective ongoing peer-to-peer communication among collaborators, greatly supplementing the existing communications via the co-ordinator (the bulletins).
- Satisfactory solutions were found to the opposing pressures on reporting imposed by ICOSAMP's dual functions, as a regional early-warning system, and as an archive of reliable information about migratory pest outbreaks. All collaborators expressed the view that the revised reporting system was practical, and would meet its objectives.

Future support of ICOSAMP institutional systems

- There is grave concern that ICOSAMP has not yet achieved sufficient momentum to be sustainable without further external support. There are at least three areas in which external support is likely to be needed in the medium term:

a) physical meetings of the collaborators within the network, ideally annually,
b) support for and maintenance of the GIS and underlying computer software sub-systems,
c) secretarial functions to supplement the (intended-to-be) automated web-based data capturing and

reporting system, and moderation of the email forum.

- After 2002, the only clear commitment to institutional support that has been obtained so far is from ARC-PPRI. ARC-PPRI has undertaken to make Margaret Kieser available to serve as co-ordinator of ICOSAMP into the future. This commitment will meet the secretariat requirements.
- I have a personal reservation about even ARC-PPRI's expressed commitment. Realistically, unless this arrangement is committed to paper as a formal Memorandum of Agreement with a specified termination date, the terms of this commitment will have to be revisited annually. Nevertheless, it is clear that there is at least the intention to provide support in the person of the co-ordinator into the future.
- Judith Pender is willing and able to support the GIS and its sub-systems, but not without being paid to do it. As she is no longer with NRI, she cannot afford to provide even minimal support on a *pro bono* basis.
- The Coordinator had preliminary discussions with the SADC representatives about support for physical meetings. There are vague possibilities that some support might be forthcoming, but absolutely no clear commitments. In any event, it is likely that any SADC support would require considerable compromises to be made by all parties. ICOSAMP collaborators would probably have to assume reporting responsibilities on behalf of other functional areas in their respective Ministries/Departments in order to justify attending quite different meetings, part of the agendas of which could address ICOSAMP business.
- **In conclusion, I believe that the future viability of ICOSAMP is going to depend on a very strong commitment by all parties to <u>proving</u> the value of the network through data collection, reporting, and through active participation in the email forum. The email forum is probably the only available vehicle for developing the arguments to be taken to prospective funders and other sources of support. Simply the record of active sensible discussion on this forum would provide a fairly convincing argument to prospective funders.**

APPENDIX 2a. MONTHLY ARMYWORM REPORTING FORM

Page no. ____ of ____ **Country:** _____ **Reported by:** _____
Date of this report: **d:** **m:** **y:** **Fax no:** _____

Record no.		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Day									
Month									
Year									
Location									
Lat deg									
Lat min									
Lat sec									
Long deg									
Long min									
Long sec									
Size of infestation (ha)									
Larvae I									
Larvae II									
Larvae III									
Larvae IV									
Larvae V									
Larvae VI									
Egg batch									
Larvae burrowing									
Pher-omone	Moths - Males								
	Moths - Females								
	Moths - Total								
Light	Moths - Males								
	Moths - Females								
	Moths - Total								
Direction of migration									
Crop 1									
Area 1 infested									
% damage 1									
Crop 2									
Area 2 infested									
% damage 2									
Crop 3									
Area 3 infested									
% damage 3									
Control undertaken?									
Control method									
Pesticide used									
Application rate (l/ha)									
Application method									
Area treated (ha)									
Rainfall (mm)									
RH (%)									
Max.Temp (C)									
Min.Temp (C)									
Mean Temp (C)									
Wind direction									

(See "Guidelines" for input of data)

APPENDIX 2b. Guidelines for completion of the ARMYWORM Monthly Reporting Form

*NB ….. Each "record" is entered from TOP to BOTTOM and **not** left to right.*

1. If you are entering information with a pen, please PRINT clearly.
2. **Page no__of__** - (top left of form) refers to the number of pages used for the current report eg. if more than 8 columns are needed for data, use another clean sheet, and number the second sheet as Page no **2 of 2**.
3. Many of the rows only require a **code letter** to be inserted. See guidelines below.
4. Complete as many rows as possible.

ROW / S		EXPLANATION
Day / Month / Year		Enter the date, month and year of the actual control OR observation eg. 30 / 03 / 2002
Location		District name OR name of the nearest town
Lat deg/min/sec Long deg/min/sec		If available, enter the latitude and longitude numbers SEPARATELY eg. 28=degrees, 23=minutes and 15=seconds
Total area infested (ha)		Estimated size of the total area infested (hectares)
Larvae I, II …. VI		Mark the appropriate box(es) with an "**x**"
Larvae Burrowing		If applicable, mark the box with an "**x**"
Pheromones	Moths - Males / Females	Record the ***average*** number of male or female moths caught per 10 Pheromone traps
	Moths - Total	ONLY record the ***total*** number of moths caught per 10 Pheromone traps **if number of males or females is unknown**
Light	Moths - Males / Females	Record the *average* number of male or female moths caught per 10 Light traps
	Moths - Total	ONLY record the ***total*** number of moths caught per 10 Light traps **if number of males or females is unknown**
Migration direction		Use the 16-point compass to indicate direction of moth migration eg. NNE or WSW
Crop 1, 2 and/or 3 (space provided for 3 crops)		For **EACH** crop infested use the following codes: **M** - Maize **S** - Sorghum **W** - Wheat **R** - Rice **Sc** - Sugar Cane **O** - Other **P** - Pasture
Area 1, 2 and/or 3		Estimate area infested per crop indicated in previous box(es) (hectares)
% Damage 1, 2 and/or 3		Estimate percentage damage per crop indicated above
Control undertaken?		Was the infestation controlled? **Y** = Yes **N** = No
Control Method		**C** - Chemical **B** - Biological
Pesticide used		The following codes should be used: **M** - Malathion **F** - Fenitrothion **Cy** - Cypermethrin **D** - Deltamethrin **C** - Carbaryl **O** - Other
Application rate (l/ha)		Volume application rate used (litres per hectare)
How applied		Type of spray equipment used. **KS** - Knapsack sprayer **HULV** - Hand-held ULV sprayer **VM** - Vehicle mounted sprayer **AM** - Aircraft mounted sprayer
Rainfall (mm)		Rainfall received on the day prior to observation or control
RH (%)		Percentage of Relative Humidity recorded on day of observation/control
Max.Temp (°C)		Maximum temperature recorded on day of observation/control
Min.Temp (°C)		Minimum temperature recorded on day of observation/control
Mean Temp (°C)		Mean temperature recorded on day of observation/control
Wind direction		Direction of wind recorded on day of observation/control

APPENDIX 3a. MONTHLY LOCUST REPORTING FORM

Page no. **Country:** **Reported by:**

Date of th **d:** **m:** **y:** **Fax no:**

Record nc		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Day									
Month									
Year									
Location									
Lat deg									
Lat min									
Lat sec									
Long deg									
Long min									
Long sec									
Total area infested (ha)									
Locust species									
Species confirmed									
Hopper phase									
Hopper stage									
Low Hoppers	Density								
	Unit								
	Min. No.								
	Max.No.								
	Estimation								
Bands	No. of bands								
	Units								
	Band size								
	Band size estimate								
	Band density								
Adult phase									
Adult maturity									
Adult behaviour									
Low Adults	Unit								
	Min. No.								
	Max.No.								
	Estimated no.								
	Density								
Swarms	Swarm size (ha)								
	Estimated size								
	Number of swarms								
	Swarm density								
	Flight direction								
Threat to neighbour?									
Country threatened									
Control undertaken?									
Area treated (ha)									
Insecticide used									
Control method									
Application rate (l/ha)									
Est. % kill									
Crop 1									
Crop 2									
Crop 3									
Damage									
Vegetation 1									
Vegetation 2									
Vegetation 3									
Vegetation 4									
Vegetation 5									
Vegetation 6									
Plant status									
Date of last rain									
Rain (mm)									
Estimated rain (mm)									
RH (%)									
Max.Temp (C)									
Min.Temp (C)									
Mean Temp (C)									
Soil moisture									

(See "Guidelines" for input of data)

APPENDIX 3b. Guidelines for completion of the LOCUST Monthly Reporting Form

*NB ….. Each "record" is entered from TOP to BOTTOM and **not** left to right.*

1. If you are entering information by hand please PRINT clearly.
2. **Page no__of___** (top left of form) refers to the number of pages used for the current report eg. if more than 8 columns are needed, use another clean sheet, and number the second sheet as Page no **2 of 2**.
3. Many of the rows only require a **code letter** to be inserted. See guidelines below.
4. Complete as many rows as possible.

ROW		EXPLANATION
Day / Month / Year		Enter the day, month and year of the observation/control on SEPARATE rows eg. day=30, month=12, year=2002
Location		District name OR name of the nearest town
Lat deg/min/sec Long deg/min/sec		**If data are available**, enter the latitude and longitude numbers SEPARATELY eg. Lat deg=28, lat min=23 and lat sec=15
Total area infested (ha)		Estimated size of the total area infested (in hectares)
Locust species		**AML** - African migratory locust **BL** - brown locust **DL** - desert locust **RL** - red locust
Species confirmed?		Identification of locust species confirmed? **C -** confirmed **U -**unconfirmed
HOPPERS	Hopper phase	**S** - solitarious (green) **T** - transient **G** - gregarious (black)
	Hoppers I, II ….VI	Mark the appropriate boxes with an "**x**"
	Fledging	Mark box with an "**x**" if hoppers are fledging
	Hopper density	**B** - band **G** – group **S** - scattered **I** - isolated **U** - unknown
	No. bands	Enter the number of bands observed / controlled
	No. bands (estimate)	If you are only able to 'estimate' the number of bands, use: **F** - few **S -** several **M** - many
	Band size estimate	**For Brown Locust use:** **S** - small (< 10m^2) **M** - medium (10 – 50m^2) **L** - large (> 50m^2) **For AML, Red, and Desert Locust use:** **S** - small (< 25m^2) **M** - medium (26m^2 – 10ha) **L** - large (> 10ha)
	Hopper behaviour	**F** - feeding **M –** marching **F+M** – feeding and marching
ADULTS	Adult phase	**S** - solitarious (green) **T** - transient **G** - gregarious (black)
	Adult maturity	**I -** immature **Mg** - maturing **M** - mature **U** - unknown *(NB. "maturing" = mixed immature and mature adults)*
	Adult behaviour	**F** - flying **B** - basking **C** - copulating **L -** laying
	Adult density	**Sw** - Swarm **G** - grouped **S** - scattered **I** - isolated **U** - unknown
	Swarm size	S **- small (< 10 ha)** M **- medium (10 – 50 ha)** L **- large (more than 50 ha)**
	Number of swarms	Number of swarms observed or controlled
	Flight displacement	Direction (16 point compass) of swarm flight eg. NNE
Control undertaken?		Were the locust controlled? **Y** - yes **N** – no
Area treated (ha)		Total size of area treated (hectares)
Insecticide used		**D** - decis **F** - fenitrothion **Fi** - fipronil **Di** - dimilin **M** - mycoinsecticide **O** – other
How applied		**KS** - knapsack sprayer **VM** - vehicle mounted sprayer **A** - aircraft **O** – other
Application rate (l/ha)		Volume application rate used (litres per hectare)
Est. % kill		Estimated percentage of kill
Crop 1, 2 or 3		Crops at risk or threatened by locusts. Mark the appropriate box(es) with an "**x**" **M** - maize **Mi** - millet **W** - wheat **Sc** - sugarcane **S** - sorghum **P** - pasture **O** - other
Damage?		**Y** - yes **N** – no
Vegetation 1, 2, 3 or 4		Write in full the type of vegetation at observation/control site eg. shrub
Date of last rain		Date last rain was recorded at the site of observation/control (format = d/mm/yy)
Rainfall (mm)		**Total** rainfall recorded in week PRIOR to observation or control
RH (%)		Percentage of Relative Humidity recorded on day of observation/control
Max.Temp (°C)		Maximum temperature recorded on day of observation/control
Min.Temp (°C)		Minimum temperature recorded on day of observation/control
Mean Temp (°C)		Mean temperature recorded on day of observation/control
Soil moisture		Dry, slightly moist, moist, wet

APPENDIX 4a. MONTHLY QUELEA REPORTING FORM

Page no. ____ of ____ **Country: _____** **Reported by: _____**
Date of this report: d: m: y: **Fax no:**

Record	1	2	3	4	5	6	7	8
Day								
Month								
Year								
Location								
Lat deg								
Lat min								
Lat sec								
Long deg								
Long min								
Long sec								
Traditional site (Y/N)								
Site abandoned (Y/N)								
Status								
Nestling stage								
Fledgling behaviour								
Distance from water (m)								
Colony/roost size (ha)								
Colony/roost size (no.birds)								
Habitat								
Vegetation 1								
Vegetation 2								
Vegetation 3								
Vegetation 4								
Millet								
Sorghum								
Rice								
Wheat								
Barley								
Manna								
Other crop								
Distance from crop (km)								
Est.% damage								
Control undertaken (Y/N)								
Control method								
Area treated (ha)								
Pesticide used								
Application rate (l/ha)								
Est. % kill								
Ecologically sensitive area								
Non-targets? (Y/N)								
Non-target species 1								
Non-target species 2								
Non-target species 3								
Rain (mm)								
RH (%)								
Max.Temp (C)								
Min.Temp (C)								
Mean Temp (C)								
Wind direction								

(See "Guidelines" for input of data)

APPENDIX 4b. Guidelines for completion of the QUELEA Monthly Reporting Form

*NB ….. Each "record" is entered from TOP to BOTTOM and **not** left to right.*

5. If you are entering information by hand please PRINT clearly.
6. **Page no__of___** (top left of form) refers to the number of pages used for the current report eg. if more than 8 columns are needed for data, use another clean sheet, and number the second sheet as Page no **2 of 2**.
7. Many of the rows only require a **code letter** to be inserted. See guidelines below.
8. Complete as many rows as possible.

ROW	EXPLANATION
Day / Month / Year	Enter the day, month and year of the observation/control on SEPARATE rows eg. day=30, month=12, year=2002
Location	District name OR name of the nearest town
Lat deg/min/sec Long deg/min/sec	**If available**, enter the latitude and longitude numbers SEPARATELY eg. Lat deg=28, lat min=23 and lat sec=15
Traditional site?	Do the birds frequently visit this site? **Y** - yes **N** - no.
Site abandoned?	Was the site abandoned by the birds? **Y** - yes **N** - no
Roosting Breeding Breeding + eggs	Mark appropriate box(es) with an "**x**"
Nestling stage	**J** - just hatched **W** - wings sprouting
Fledgling behaviour	**S** - short fly **F** - free fly
Distance from water (m)	Distance of site from nearest water (metres)
Colony/roost size (ha)	Estimated size of the colony/roost (hectares)
Colony/roost size (no.birds)	Estimated number of birds in the colony/roost
Habitat	Use the following codes: **S** - savanna (= thorns, mopanie, wattle, eucalyptus, poplar) **W** - wetland (= reeds, irrigation dam, riverbush, wetland) **O** - other (= silk, babala, sorghum, citrus, maize, any other)
Vegetation 1/2/3	Write vegetation types in full eg. thorns, mopanie, wattle, eucalyptus, poplar, reeds, irrigation dam, riverbush, wetland, silk, babala, sorghum, citrus, maize, or other
Millet/Sorghum/Rice/Wheat /Barley/Manna/Other crop	Crops as risk or threatened by the birds. Mark the appropriate box(es) with an "**x**"
Distance from crop (km)	Distance of roost/colony from the threatened crop (kilometres)
Est.% crop damage	Estimated damage to crop expressed as a percentage
Control undertaken?	Were the quelea controlled? **Y** - yes **N** – no
Control method	State as: **E** - explosion **C** - chemical **H** - harvesting
Area treated (ha)	Total size of area treated (hectares)
Pesticide used	Write in name of pesticide used
Application rate (l/ha)	Volume application rate used (litres per hectare)
Est.% kill	Estimated percentage of birds killed
Ecologically sensitive area?	**Y** - yes **N** - No
Non-targets?	Were any non-target species killed? **Y** - yes **N** - no
Non-target species 1/2/3	Write in species (or common) name(s) of any non-targets affected
Rainfall (mm)	Rainfall recorded in week PRIOR to observation or control
RH (%)	Percentage of Relative Humidity recorded on day of observation/control
Max.Temp (°C)	Maximum temperature recorded on day of observation/control
Min.Temp (°C)	Minimum temperature recorded on day of observation/control
Mean Team (°C)	Mean temperature recorded on day of observation/control
Wind direction	Direction (16 point compass) of wind eg. NNE