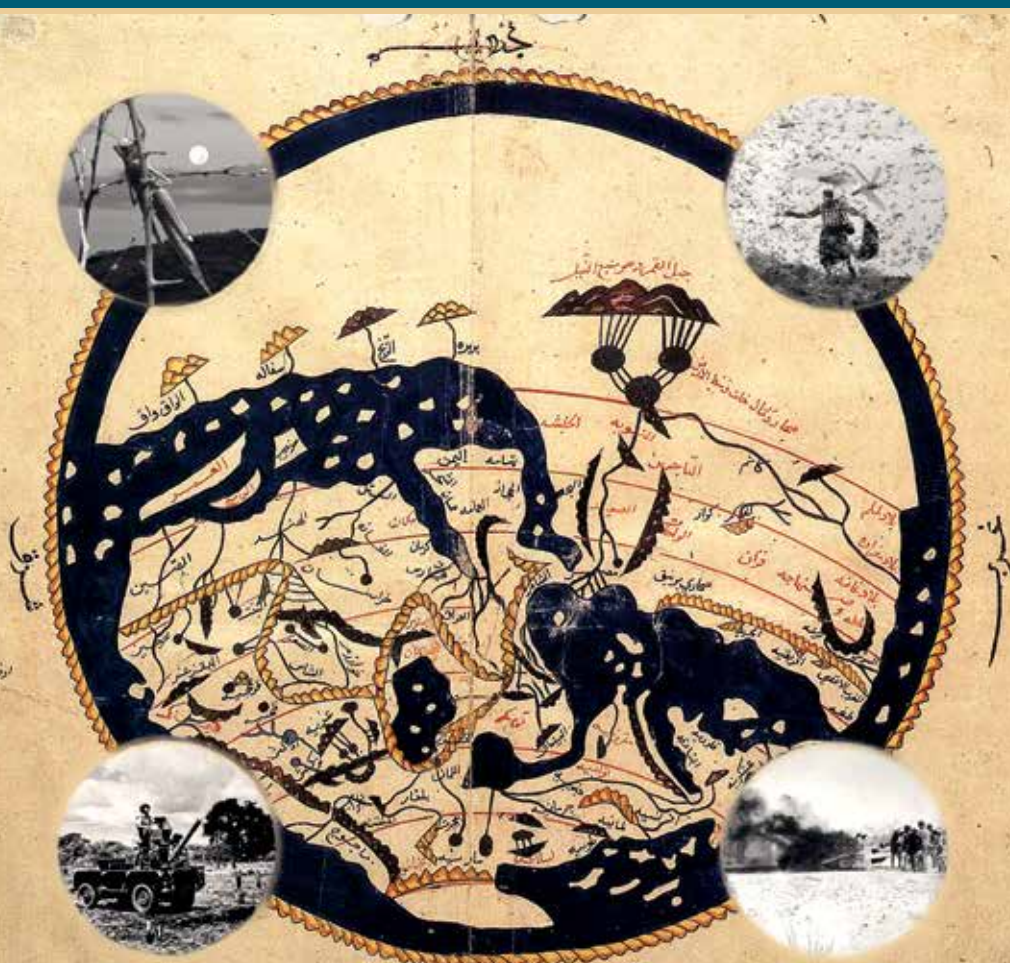




Food and Agriculture  
Organization of the  
United Nations



## A celebration of 50 years of service 1967 – 2017



The FAO Commission for  
Controlling the Desert Locust  
in the Central Region



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# **The FAO Commission for Controlling the Desert Locust in the Central Region**

## **A Celebration of 50 Years of Service**

*Christian Pantenius and Munir Butrous*

COMMISSION FOR CONTROLLING THE DESERT LOCUST IN THE CENTRAL REGION  
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Cairo, 2017

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Front page:

The first most accurate map of the world in pre-modern times  
created by the Arab geographer and cartographer  
Ash-Sharīf al-Idrīsī (1100–1165) in 1154  
for King Roger II of Sicily.

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## Foreword

**W**hen the Food and Agriculture Organization of the United Nations (FAO) was founded more than 70 years ago with the aim to fight world hunger, we immediately launched our global Desert Locust programme in 1952 that embarked on the fight against Desert Locust, a scourge that has haunted the very existence of humanity since the dawn of time.

FAO called for the consolidation of regional efforts and resources through the establishment of regional commissions. The objective was to allow us to work better with our partners from member countries and dedicated research centres to face the proliferation and invasion of Desert Locusts that cover almost 29 million square kilometres, stretching from the Indian subcontinent westwards to the Atlantic Ocean.

We wanted to ensure that all affected countries would have the same ability to fight locust plagues, bearing in mind that nobody can fight Desert Locust alone, and that we need to take, collectively, all possible measures to combat the Desert Locust and reduce its damage to agricultural crops and fodder. These efforts were further streamlined by coordinating regional efforts and implementing related policies. The international initiatives to fight the Desert Locust were coordinated by FAO, which provided specialised assistance.

This book goes beyond commemorating 50 years of the active existence of the FAO Commission for Controlling the Desert Locust in the Near East, which was created in 1967. It also narrates the long relationship between humans and Desert Locusts, records the historic scourges thousands of years ago, shows drawings and fossils of Desert Locusts, and the mention of locusts in the scriptures and the literature of ancient civilizations.

As we celebrate the 50<sup>th</sup> anniversary, the Golden Jubilee, of the establishment of the largest Desert Locust Commission under the umbrella of FAO, we look back with pride to our collaborative achievements, and with a greater confidence in the future, in spite of the precariousness of climate change in the twenty-first century and the uncertainty of its related consequences.

We are confident because our 50-year old Commission has played a major role in reducing the severity of a number of Desert Locust upsurges and plagues. This would not have been achieved without each member country, and I am keen to thank all those who have worked at the Commission, or supported it, for developing the tools and empowering us with the policies and the on-the-ground support, be it

in the Desert Locust breeding countries, their temporary sanctuaries or their final destinations. Together, we have trained qualified human resources, regularly upgraded their equipment and encouraged researchers worldwide to take Desert Locust control into consideration while developing new equipment and products.

Together, we went off the beaten track, many times, to go beyond the conventional monitoring methods by applying sophisticated hi-tech innovations for locating Desert Locusts, analysing their status and predicting the future through automated data analysis.

Building on our success in the past 50 years, we can say that Desert Locust populations are better managed today but nevertheless, we have to stay vigilant for any new Desert Locust threats. We have all proved that with our collective work, we can really make the world a better place.



**Abdessalam Ould Ahmed**  
FAO Assistant Director-General and  
Regional Representative,  
Regional Office for the Near East (RNE)



## Preface

**F**or thousands of years Desert Locust plagues have represented a menace to people's livelihoods. Usually such plagues are triggered by heavy rains falling in desert habitats and creating conditions favourable for breeding. Locusts can then quickly increase in numbers and change their behaviour from the solitary to the gregarious phase, forming large swarms.

Locust swarms can fly for hundreds of kilometres between different breeding areas and rapidly move from one country or region to another. Combating these fast-moving locust swarms requires special technical, managerial and logistical skills. National and regional capacities are required to coordinate locust control operations effectively and to minimize the risks to food security and subsequent economic and social damage.

The first systematic attempts to fight locusts started in the early twentieth century. This led to a better understanding of the biology and the behaviour of the Desert Locust and created the basis for better organized and more efficient control. With scientific and technical advances, the recommended control strategies gradually moved from reactive to preventive control. To achieve prevention, it was necessary to react faster with control operations targeted earlier at dangerous locust developments before plagues could develop.

Since its inception in 1945, the Food and Agriculture Organization of the United Nations (FAO) has given particular attention to the Desert Locust problem. Already in the early 1950s FAO advocated the need for regional locust control efforts in the Desert Locust areas. It was felt that this would enhance cooperation between the affected countries and would promote both the exchange of locust information and the implementation of effective control tactics.

In 1953, the Organization established the Arabian Peninsula Desert Locust Control Sub-Committee under the FAO Technical Advisory Committee (TAC) on Desert Locust Control, followed by the establishment of the International Desert Locust Control Centre in Jeddah, Saudi Arabia, in 1954. And in 1961, the 11<sup>th</sup> session of the FAO Conference recommended the establishment of a regional FAO Commission for Controlling the Desert Locust in the Near East (later abbreviated as CRC). A draft agreement for the establishment of a Near East locust commission was prepared at a special meeting and, subsequently, this was approved by the 44<sup>th</sup> session of the FAO Council in June, 1965. After ratification by the initial member countries of the proposed Commission, the Establishment Agreement entered into force on 21 February 1967.

The Commission was mandated to promote regional cooperation and coordination of Desert Locust control in its region, to support capacity development, to assist the national programmes and to stimulate joint activities. Since its inception, CRC has gone through a number of difficult situations and faced several major locust upsurges and plagues during the 50 years of its existence. But despite the many challenges, major damage by Desert Locust to crop production within its mandated region has largely been prevented. Furthermore, CRC has proved its relevance, directly and indirectly, by preventing major locust emergencies in recent years, and this has benefitted the people of its member countries.

The 29<sup>th</sup> CRC session held in Dubai, United Arab Emirates in November 2014 decided to commemorate the 50<sup>th</sup> anniversary of the establishment of CRC, which falls on 21 February 2017, by supporting the preparation and production of a book. The session agreed that the book should document the origin and rationale of locust control efforts and the history of CRC, and that it should draw on the many historical documents, accounts and references that are available. The book should be shared with stakeholders and other parties who may not be familiar with but are interested in the Desert Locust subject.

It is also hoped that this book will serve not only as a guide for decision makers who will shape and direct the future of CRC but also be an inspiration for the next generations of locust officers.

The book illustrates how member countries contributed to and benefitted from their Commission. First, it describes the impact the Desert Locust has had on different human societies in our region, their desperate struggle over the centuries against this God-given threat and how the perception and understanding of this extraordinary insect pest has changed during the past 150 years. It highlights the efforts and attention paid by the international community to the Desert Locust problem and how, later on, FAO was mandated to take the global lead in this matter. It covers how the concept of regional locust control organizations developed, the work undertaken by CRC and how the Commission expanded. It records the views of the Ministers of Agriculture of the member countries and the efforts that have been made to fight against the Desert Locust.

The book also contains a chapter on the important influence that the Desert Locust component of the Emergency Prevention System (EMPRES) for Transboundary Animal and Plant Pests and Diseases had on introducing crucial elements of plague prevention. Special attention is given to all the joint organizational and technical efforts that have been carried out under the auspices of CRC. Details are provided about the biology of the Desert Locust, how it has troubled the region during the past 50 years and what measures have been introduced that will help to prevent future Desert Locust plagues. In addition, the opportunity has been given to individuals to contribute to the book with their own personal accounts and field experiences during locust operations.

Finally, I would like to thank the authors of this book, Mr Christian Pantenius and Mr Munir Butrous, for their efforts in analysing and assembling the many recent and historical documents and all those persons who contributed with their ideas, advice and guidance. Our special thanks go to those who checked the draft manuscript for its historical accuracy and technical correctness, in particular Mr Clive Elliott, former Senior Officer of the FAO Locust and other Migratory Pests Group, and Mr Keith Cressman, Senior Locust Forecasting Officer in the Desert Locust Information Service (DLIS) at FAO headquarters, and to thank Mr Mohamed Abdelrahim Morgan who revised the Arabic translation. We are grateful to all the member countries for their support and the information they provided regarding their national locust control programmes.

We are deeply indebted to the Natural History Museum (NHM) in London, United Kingdom for allowing access to its rich and fascinating anti-locust archive and its permission to use some of its priceless historical photos for our book. In this respect, my special thanks go to Ms Julie Harvey, Head of the Centre for Arts and Humanities Research at the NHM, and her colleagues for having supported and facilitated the author's research work at the NHM library. Last but not least, we would like to thank Ms Lidia Abdel Shahid, Ms Antonietta Drappa and Mr Essam Khalifah for assistance they provided in many organizational and administrative aspects, and for having facilitated access to the locust archives at FAO DLIS and CRC offices.

We all have the same hope and carry the same dreams of a better future for the benefit of the people in our region, hoping that we have succeeded in documenting your shared ambitions in this book. The task was not easy. It was hard work and involved many critical issues that sparked long discussions to achieve our aspirations in accomplishing this book.

With that, I am grateful to all the representatives of the member countries for their commitment and I sincerely thank their governments for their steadfast support and the good cooperation that has contributed to their Commission during the past 50 years. We look forward to another century of good accomplishments for the benefit of all the people who live in this region and beyond.

**Mamoon Al-Alawi**  
Secretary CRC

Cairo, 17 February 2017



# List of Acronyms

AD	Anno Domini
AGPP	Plant Protection Service (FAO)
AgDGPS	Agricultural Differential Global Positioning System
ALRC	Anti-Locust Research Centre
APO	Associate Professional Officer
BC	Before Christ
CERF	UN Central Emergency Response Fund
CFP	Country focus programme
CLCPANO	FAO Commission de lutte contre le Criquet pèlerin en Afrique du Nord-ouest / FAO Commission for Controlling the Desert Locust in North-West Africa
CLCPRO	FAO Commission de lutte contre le Criquet pèlerin dans la Région Occidentale / FAO Commission for Controlling the Desert Locust in the Western Region
cm	centimetre
CR	Central Region
CRC	FAO Commission for Controlling the Desert Locust in the Central Region
DDT	Dichloro-diphenyl-trichloroethane
DeLCoPA	Desert Locust Contingency Planning Assistant
DLC	Desert Locust Control (Organization)
DLCC	FAO Desert Locust Control Committee
DLCO-EA	Desert Locust Control Organization for Eastern Africa
DLIS	Desert Locust Information Service
DLMCC	Desert Locust Monitoring and Control Centre
DLS	Desert Locust Survey (Organization)
DNOC	Dinitro-ortho-cresol
DPCQ	Department of Pest Control and Quarantine
DPPQ	Division of Plant Protection and Quarantine
EC	Emulsifiable concentrate
ECLO	Emergency Centre for Locust Operations
eLERT	electronic Locust Emergency Response Toolkit
ELO	EMPRES liaison officer
EMPRES	Emergency Prevention System for Transboundary Animal and Plant Pests and Diseases
FAO	Food and Agriculture Organization of the United Nations

g	gram
GDIAAA	General Directorate for Locust and Agricultural Aviation Affairs
GIS	Geographical information system
GPS	Global positioning system
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit / German Technical Cooperation Agency
ha	hectare
HF	High frequency
HQ	Headquarters
IDB	Islamic Development Bank
IDLCC	FAO International Desert Locust Control Centre
IDLIS	International Desert Locust Information Service
IIA	International Institute of Agriculture
IRLCO-CSA	International Red Locust Control Organisation for Central and Southern Africa
IT	Information technology
ITCZ	Inter-Tropical Convergence Zone
km	kilometre
LCC/D/S/U	Locust Control Centre/Department/Section/Unit
m	metre
MEALU	Middle East Anti-Locust Unit
mm	millimetre
MoA	Ministry of Agriculture
MoAAR	Ministry of Agriculture and Agrarian Reform
MoAF	Ministry of Agriculture and Forestry
MoANRD	Ministry of Agriculture and Natural Resources Development
MoU	Memorandum of Understanding
MPCU	Migratory Pests Control Unit
MPMU	Migratory Pest Management Unit
M.Sc.	Master of Science
NCLCR	National Centre for Locust Control and Research
NHM	Natural History Museum
NLCU	National Locust Control Unit
NPO	National Professional Officer
NRI	Natural Resources Institute
OCLALAV	L'Organisation commune de lutte antiacridienne et de lutte antiaviaire / Common Organization for the Control of the Desert Locust and Bird Pests

OICMA	Organisation internationale contre le Criquet migrateur africain / International African Migratory Locust Organization
PAN	Phenylacetone nitrile
PC	Programme Coordinator
PDR	People's Democratic Republic (of Yemen)
PHD	Plant Health Division
PPD	Plant Protection Directorate/Department/Division
PPPD	Plant Protection and Phytosanitary Directorate
PPQD	Plant Protection and Quarantine Division
RAF	Royal Air Force
RAMSES	Reconnaissance and Management System of the Environment of Schistocerca
RBA	Regional Bureaux of Agriculture
RBM	Results-based management
RNE	FAO Regional Office for the Near East
SF	Special Fund
SFO	Senior Field Officer
SOP	Standard Operating Procedure
sp.	species
SWAC	FAO Commission for Controlling the Desert Locust in South-West Asia
SWARMS	Schistocerca Warning and Management System
WFP	World Food Programme
WR	Western Region
TAC	Technical Advisory Committee
TCP	Technical Cooperation Programme
ToT	Training of trainers
UAE	United Arab Emirates
UK	United Kingdom
ULV	Ultra low volume
UN	United Nations
UNDP	United Nations Development Programme
UNSF	United Nations Special Fund
USAID	United States Agency for International Development
USD	United States Dollar





# Timeline

## *1889–1910 Desert Locust plague years*

1906 Founding of the International Institute of Agriculture (IIA) in Rome, Italy

## *1912–1919 Desert Locust plague years*

1916 A first international anti-locust conference planned by IIA for 1916 but postponed until 1920 because of World War I

1920 The first international anti-locust conference convened in Rome; adopted an international convention to control the Desert Locust, share information on locust movements and to submit reports to IIA

1921 Publication of the locust phase theory by B.P. Uvarov

## *1926–1933 Desert Locust plague years*

1926 Phase change among Desert Locusts observed and documented for the first time in Sudan

1929 The Locust Sub-Committee established at the Imperial Institute of Entomology in London, United Kingdom; the beginning of systematic compilation, mapping and analysis of locust information and data; superseded in 1945 by the Anti-Locust Research Centre (ALRC). ALRC becomes part of the Ministry of Overseas Development and is later moved to Chatham, United Kingdom as part of the Natural Resources Institute (NRI) in 1964

1931 First International Conference for Anti-Locust Research convened in Rome; confirmed the centralized approach of locust information management

1932 Second International Conference for Anti-Locust Research convened in Paris; endorsed the regular collection, exchange and analysis of locust and habitat information

1934 Third International Conference for Anti-Locust Research convened in London

1936 Fourth International Conference for Anti-Locust Research convened in Cairo; outlined first ideas of preventive locust control

1938 Fifth International Conference for Anti-Locust Research convened in Brussels; proposed a permanent international organization for the preventive control of the Desert Locust in Eastern Africa and Western Asia

### *1940–1948    Desert Locust plague years*

- |      |   |
|------|---|
| 1941 | First plague alert issued   |
| 1942 | First chemical control of hopper bands by using sodium arsenate baits   |
| 1943 | Middle East Anti-Locust Unit (MEALU) created by the British Government with headquarters in Cairo, Egypt  |
| 1943 | First Desert Locust Bulletin published  |
| 1944 | First aerial pesticide application trials conducted   |
| 1945 | The Food and Agriculture Organization (FAO) constituted in Quebec, Canada with headquarters in Washington D.C., United States of America, superseding IIA. Under the provision of the Expanded Programme of Technical Assistance (EPTA) in 1951, FAO starts focusing on locust issues |
| 1948 | Establishment of the Desert Locust Survey (DLS) department of the East African Common Services Organization replaces the British wartime anti-locust organizations such as MEALU  |

### *1949–1963    Desert Locust plague years*

- |      |   |
|------|---|
| 1950 | Establishment of the Desert Locust Control (DLC) department, the control component of DLS. Its mandate covered the DLS area as well as Egypt and Sudan; DLS and DLC superseded by DLCO-EA in 1962                                     |
| 1951 | Transfer of FAO headquarters from Washington, D.C. to Rome, Italy   |
| 1951 | Establishment of the Technical Advisory Committee (TAC) on Desert Locust Control at FAO headquarters  |
| 1953 | Establishment of the FAO Coordinating Committee for the Control of the Desert Locust in the Arabian Peninsula (that expanded to become the DLCC in 1955)  |
| 1954 | Establishment of the FAO International Desert Locust Control Centre (IDLCC) in Jeddah, Saudi Arabia   |
| 1955 | FAO establishes the Desert Locust Control Committee (DLCC) and an Executive Committee for Desert Locust Control in the Arabian Peninsula (that was renamed as the FAO Arabian Peninsular Desert Locust Control Sub-Committee in 1957) |
| 1956 | Initiation of the United Nations Special Fund (UNSF, later UNDP) Desert Locust Project  |

1957	The seventh TAC session recommends division of locust distribution area into three regions to facilitate better coordination of locust control
1957	Establishment of the FAO East African Desert Locust Control Sub-Committee
1958	The International Desert Locust Information Service (IDLIS) established at ALRC in London; renamed as Desert Locust Information Service (DLIS) in 1960
1960	The UNSF Desert Locust Project becomes operational
1961	The 11 <sup>th</sup> session of the FAO Conference recommends the establishment of an FAO Commission for Controlling the Desert Locust in the Near East
1962	On initiative of FAO, establishment of the Desert Locust Control Organization for Eastern Africa (DLCO-EA), replacing DLS and DLC
1964	FAO establishes the Commission for Controlling the Desert Locust in South-West Asia (SWAC)
1965	In July 1965, the 44 <sup>th</sup> session of the FAO Council approves the establishment of a Near East locust commission
1965	A special meeting convened in Beirut, Lebanon considers a draft agreement for establishing the Near East locust commission
1966	Lebanon and Jordan submit their instruments of acceptance to join the Near East locust commission
<b>1967–1969</b>	<b><i>Desert Locust upsurge and plague years</i></b>
1967	FAO establishes the Commission for Controlling the Desert Locust in the Near East; Jeddah, Saudi Arabia proposed as the first seat of the Commission; Sudan, Egypt and Kuwait join
1968	Qatar and Syria apply for membership in CRC
1969	The first CRC session held in Baghdad, Iraq on 1–5 February
1969	Bahrain and Yemen join CRC
1969	The 13 <sup>th</sup> DLCC session approves a long-term strategy for Desert Locust plague prevention
1970	Iraq joins CRC

- 1971            FAO establishes the Commission for Controlling the Desert Locust in North-West Africa (CLCPANO)
- 1972–1974      Desert Locust upsurge years*
- 1972            Saudi Arabia and Oman request joining CRC
- 1974            The United Arab Emirates joins CRC
- 1977–1979      Desert Locust upsurge years*
- 1978            Transfer of DLIS from ALRC in London to FAO headquarters in Rome
- 1985–1989      Desert Locust upsurge and plague years*
- 1992–1993    Transfer of CRC seat from Jeddah to Cairo
- 1992–1994      Desert Locust upsurge years*
- 1993            The 19<sup>th</sup> CRC session recommends considering Djibouti, Ethiopia, Eritrea and Somalia as new members
- 1994            The FAO Near East Desert Locust Commission renamed as the FAO Commission for Controlling the Desert Locust in the Central Region (CRC)
- 1994            The 106<sup>th</sup> session of the FAO Council adopts the programme for preventive locust control in the Central Region (EMPRES/CR)
- 1994–1996      Desert Locust upsurge years*
- 1995            Initiation of preparatory EMPRES/CR activities; first EMPRES Liaison Officers meeting held in Addis Ababa, Ethiopia
- 1996            The global geographic information system SWARMS (**S**chistocerca **W**ARNING and **M**ANAGEMENT **S**ystem) established in DLIS to manage, map and analyse locust, environmental data and remote sensing imagery
- 1996–1998      Desert Locust upsurge years*
- 1997            The EMPRES/CR Programme becomes operational; first seat at Asmara, Eritrea
- 1997            The national locust geographic information system RAMSES (**R**econnaisance **A**nd **M**ANAGEMENT **S**ystem of the **E**nvironment of **S**chistocerca) introduced in CRC frontline countries

2000	The first eLocust digital field data logger and transmission system introduced in CRC frontline countries
2001	Transfer of EMPRES/CR seat from Asmara to Cairo
2002	FAO establishes the Commission for Controlling the Desert Locust in the Western Region (CLCPRO), replacing CLCPANO
2002	Djibouti becomes a member of CRC
2002	Memorandum of Understanding between CRC and DLCO-EA prepared to streamline coordination of joint efforts; endorsed by the DLCO-EA Council of Ministers in 2004
<b>2003–2005</b>	<b><i>Desert Locust upsurge years</i></b>
2003	The Desert Locust Master Trainer Manual introduced in the Central Region
2004	Ethiopia applies for membership in CRC
2004	Desert Locust Standard Operating Procedures (SOPs) developed by CRC-EMPRES/CR
2006	eLocust2 introduced in the Central Region
2006	The CRC-EMPRES/CR website goes online
2006	Eritrea accepted as 16 <sup>th</sup> member of CRC
2006	EMPRES/CR handed over to CRC
2009	Introduction of the first version of the electronic Desert Locust Contingency Planning Assistant (DeLCoPA)
2015	eLocust3 and RAMSESV4 introduced in the Central Region
2017	50 <sup>th</sup> anniversary of the Commission for Controlling the Desert Locust in the Central Region



# Statements from the member countries

## Kingdom of Bahrain

الوزير  
The Minister



وزارة الأشغال  
Ministry of Works,  
وتشؤون البلديات  
Municipalities Affairs  
والتخطيط العمراني  
and Urban Planning

### كلمة وزارة الأشغال وشئون البلديات والتخطيط العمراني بمناسبة الذكرى الخمسين لإنشاء هيئة مكافحة الجراد الصحراوي في المنطقة الوسطى بمنظمة الأغذية والزراعة للأمم المتحدة

إيماناً من مملكة البحرين بأهمية وفاعلية العمل الجماعي على المستوى الدولي خصوصاً في التعامل مع الأزمات والكوارث العابرة للحدود، جاء إنضمام مملكة البحرين إلى هيئة مكافحة الجراد الصحراوي في المنطقة الوسطى كأحد الهيئات التابعة لمنظمة الأغذية والزراعة (الفاو) والتي كان الهدف الرئيسي لإنشائها هو تشجيع التعاون والتنسيق بين الدول الأعضاء في المنطقة لتعزيز القدرات في مجال الاستكشاف والرصد والمكافحة للجراد الصحراوي ومنذ إنضمام مملكة البحرين بتاريخ 24 فبراير 1969 أي بعد عامين من دخول إتفاقية إنشاء الهيئة حيز التنفيذ حرصت مملكة البحرين على أن تكون عضواً فاعلاً في أنشطة الهيئة المختلفة والإفادة من عضويتها في بناء القدرات في مجال التعامل مع الجراد الصحراوي. وبذلك كان للبحرين نصيب وافر من مساهمات الهيئة المتنوعة سواء من خلال توفير المعلومات النورية الخاصة بحالة الجراد الصحراوي في المنطقة، أو من خلال التدريب الفني للكوادر البشرية العاملة في برامج المكافحة بالوزارة، أو من خلال توفير بعض الآلات والأجهزة المستخدمة في عمليات الرصد والمكافحة.

لا شك أن هيئة مكافحة الجراد الصحراوي في المنطقة الوسطى وبفضل الخطة التي وضعتها والبرامج المتنوعة التي تم تنفيذها بالإضافة إلى تعاون الدول الأعضاء بها، قد حققت العديد من الإنجازات لعل من أهمها تعزيز التعاون الإقليمي بين الدول الأعضاء وتوفير الكوادر الوطنية المتخصصة وتشكيل وحدات وطنية لإدارة عمليات مكافحة الجراد الصحراوي في الدول الأعضاء، هذه الإنجازات ساهمت وبشكل فاعل في جعل دول الإقليم أكثر أماناً من مخاطر غزو الجراد وذات قاعدة صلبة في التعامل مع فورات الجراد إن حصلت.

وفي الذكرى الخمسين لتأسيس هيئة مكافحة الجراد الصحراوي في المنطقة الوسطى يسرنا أن نهنيئ الهيئة في هذه الذكرى وأن نعبر عن تقديرنا للجهود التي بذلتها الهيئة في مجال التصدي للجراد الصحراوي والدور المحوري الذي لعبته في مساعدة الدول الأعضاء في التعامل مع هذه الآفة الخطيرة بتنسيق الجهود بين الدول لتلافي الأضرار الاقتصادية الخطيرة الناجمة عن غزو وإنتشار الجراد الصحراوي.

كما نتقدم بجزيل الشكر وغاية الإمتنان للمساهمات التي قدمتها الهيئة لمملكة البحرين والتي كانت خير معين للعاملين بشئون الزراعة ليكونوا على جاهزية وإستعداد تام للتعامل مع هذه الآفة.

كما نتمنى للهيئة التوفيق في جهودها في التنسيق والتعاون مع الدول الأعضاء والعديد من النجاحات في جميع مشاريعها المستقبلية وتحقيق الأهداف المرجوة. والله الموفق.

الحظ

عصام بن عبد الله خلف  
وزير الأشغال وشئون البلديات والتخطيط العمراني

## Republic of Djibouti

REPUBLIQUE DE DJIBOUTI  
Unité - Egalité - Paix

MINISTÈRE DE L'AGRICULTURE,  
DE L'EAU, DE LA PÊCHE, DE L'ÉLEVAGE  
ET DES RESSOURCES HALIÉUTIQUES

جمهورية جيبوتي  
الوحدة - المساواة - السلام



Ministère de l'Agriculture, de l'Eau, de la Pêche, de l'Élevage et des Ressources Halieutiques  
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وزارة الزراعة والثروة الحيوانية  
والصيد البحري  
والصناعة عن الموارد المائية

تلف : ١٢ ٩٧ : ٣٥  
تلكس : ٣٥١١ : ٣٥  
فلكس : ٣١ ٧٨ : ٣٥  
ص.ب. ٤٥٣

N°359/MAEPE-RH

Djibouti, le 28 MAR 2016

## LE MINISTRE

On the Fiftieth Anniversary of the  
FAO Commission for Controlling the Desert Locust in the Central Region (CRC)

At a time when the FAO Commission for Controlling the Desert Locust in the Central Region (CRC) is celebrating its Fiftieth Anniversary, I would like to extend, a well-deserved, congratulations to the Commission member countries and its secretariat.

I believe that the Commission has played an important role in coordinating effective Desert Locust control not only among member countries, but also between sister organizations with similar mandates under FAO umbrella. Since its establishment and coming into force in 1967, the Commission has encouraged member countries to follow preventive control strategies and worked to enhance their capacities to monitor, detect and combat Desert Locust infestation.

Djibouti, has joined the EMPRES programme in 1997 and the CRC in 2002. As a result, member countries made substantial advances in establishing and reinforcing their national preventive management and are playing a fundamental role in FAO's global Desert Locust early warning system.

We are fully confident that regional and international collaboration is important in controlling and managing of transboundary pest, especially Desert Locust due to ravaged agriculture crops and pastures in the region.

Thanks to the Commission for technical capacity, institution development and availability of appropriate logistics such as: GPS, ULV sprayers, publications, training tools and other required equipment, in order to facilitate locust operations to be undertaken in a more effectively manner than any time before.

On occasion of Fiftieth Anniversary, the Ministry of Agriculture, Fisheries, livestock and Fishery resource and current president of DLCO-EA, council of ministers would like to take this opportunity and wish all of success to the Commission and another fruitful coming fifty years.


MOHAMED AHMED AWALEH





## Arab Republic of Egypt

بسم الله الرحمن الرحيم

  
جمهورية مصر العربية  
وزارة الزراعة واستصلاح الأراضي  
الوزير

يسعدني ويطيب لي بالأصالة عن نفسي وبالإنيابة عن كافة العاملين في وزارة الزراعة واستصلاح الأراضي وخاصة الإدارة العامة لشئون الجراد والطيران الزراعي أن أتقدم باحر التهناتي والتبريكات لهيئة مكافحة الجراد الصحراوي في المنطقة الوسطى (CRC) بمنظمة الأغذية والزراعة (فاو) بمناسبة مرور ٥٠ عاما على إنشائها راجين لها دوام التوفيق والتقدم.

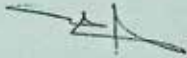
إن تحقيق الأمن الغذائي كان ولا يزال من أهم أولويات الاستراتيجية الزراعية، وهو هدف سامي لا يتحقق إلا بمكافحة الآفات بشكل عام وأفة الجراد الصحراوي بشكل خاص وذلك لما لها من خطورة كبيرة في مهاجمة المحاصيل الزراعية والقضاء عليها في فترات قصيرة نسبيا مقارنة بالآفات الأخرى. ولهذا فقد قامت وزارة الزراعة بإنشاء قسم مكافحة الجراد الصحراوي التابع للإدارة العامة لمكافحة الآفات بالقرار الجمهوري سنة ١٩٦٤ وبعد ذلك إنشاء الإدارة العامة لشئون الجراد والطيران الزراعي التابعة للإدارة المركزية لمكافحة الآفات ضمن قطاع الخدمات بوزارة الزراعة.

ومما لا شك فيه أن التعاون مع الدول المعرضة للإصابة بالجراد من تبادل المعلومات والتنسيق المستمر مع هيئة مكافحة الجراد الصحراوي في المنطقة الوسطى باعتبارها حلقة الوصل بين الدول الأعضاء في الهيئة ساهم في الاستعداد المبكر لمواسم تكاثر الجراد وتجهيز الإمكانيات والمعدات مما أدى إلى الحد كثيراً من أخطار غزوات الجراد الصحراوي التي كانت تحدث بشكل اكبر فيما مضى.

وفي الختام نرجو لهيئتك الموقرة التوفيق والتجاح وخمسين عاما أخرى من التقدم والازدهار وخدمة الدول الأعضاء في هذا المجال.

شاكرين ومقدرين مجهودكم وتعاونكم الدائم ،،

وزير  
الزراعة واستصلاح الأراضي

  
أ. ه. مسمار

المعنوان : وزارة الزراعة واستصلاح الأراضي - ١ ش وزارة الزراعة - الدقي - الجيزة  
هاتف : ٣٣٧٧٢٥٣ - ٣٣٧٧٢٥٧ - ٣٣٧٧٢٥٦  
فاكس : ٣٣٧٧٢٥٥

## State of Eritrea

The State of Eritrea  
Ministry of Agriculture



دولة إرتريا  
وزارة الزراعة

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*Office of the Minister*

ዕለት/Date: 14/01/2016

ቁ.መ/Ref: 0.1/12/D.11/16

At a time when the FAO Commission for Controlling the Desert Locust in the Central Region is celebrating its Fiftieth Anniversary, I would like to extend, a well deserved, congratulations to the Commission and its management.

I believe that the Commission has played a crucial role in coordinating effective desert locust control not only among member countries, but also between sister organizations with similar mandates.

Eritrea, as a front-line member country with summer and winter breeding areas, has played its part in controlling desert locust to the satisfaction of the country and the region at large. At this juncture I am happy to announce that Eritrea has never let locusts fly from its breeding areas as it has been conducting effective surveys and ground controls all the way. This is, of course, a reflection of decades of experience as Asmara, Eritrea was the Head Quarter of Desert Locust Control Organization-East Africa (DLCO-EA) during its establishment in 1962.

Right after the independence of Eritrea, we have joined the EMPRES in 1997 and the CRC in 2006 and we have been an active member of the CRC ever since.

In those early days, the desert locust management and operation was under the Department of Land Resources through its division of Plant Protection. There was no dedicated entity that deals with the threat of Desert Locust. The Plant Protection Division was coordinating the survey and control work inside Eritrea and with other member countries and especially with our immediate neighbours.

This time, there is an elaborate pyramidal management architecture, headed by the Minister of Agriculture and which includes the Administrators of the respective regions, the Director General of Extension and other relevant Directors and the Head of the dedicated Desert Locust Unit. Farmers and scouts, from the locust prone villages and sub-zones, form the base of the pyramid. During an upsurge weekly meetings take place at the Head Quarter chaired by the Minister and prompt decisions are made to take effective action in a timely fashion. Administrators do likewise in their respective regions.

Thanks to the availability of appropriate logistics like tents, with all the necessary facilities, GPS, e-locusts and other communication equipment, the job of controlling is done more effectively than any time before.

FAO's and CRC's coordinating activities in terms of exchanging timely and accurate reports, comparing notes, exchange of experiences, provision of, the much needed, material and logistical support, to front-line countries, including Eritrea as well as training has indeed empowered member countries like Eritrea to do their job better. And this is precisely the reason why our CRC region is faring much better in managing and controlling desert locust upsurge and its impact. I believe it will even be more so if the region avails enough emergency fund for logistics and pesticides to the front-line countries for effective and timely ground control which is more cost-effective.

Regards,

*Cheraine Berhe*  
CHERAINE BERHE  
MINISTER OF AGRICULTURE



Tel. 291-1-181499 Fax: 291-1-181415 Box: 1048 email: [0291181499@gmail.com](mailto:0291181499@gmail.com) Asmara Eritrea.

## Federal Democratic Republic of Ethiopia



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Federal Democratic Republic of Ethiopia  
MINISTRY OF AGRICULTURE AND NATURAL RESOURCES

\*TC No. 21/AA12/2/10  
\*Date 22/03/2016

**The FAO Commission for Controlling the Desert Locust  
in the Central Region (CRC)**  
**Addis Ababa**

**Re:- Country Statement from Ethiopia on the Fiftieth Anniversary of the FAO  
Commission for Controlling the Desert Locust in the Central region**

At the outset, on behalf of the Ministry of Agriculture and Natural Resources of the Federal Democratic Republic of Ethiopia and that of my own, I would like to congratulate the member countries, the management of the FAO Commission, and all partners engaged in controlling and managing this dreadful pest at the time of the observance of the fiftieth anniversary celebration of the Commission.

We recognize that desert locust is known for its devastating damage on crops, pasture and forest plantations since the time of memory. Moreover, we also understand the migratory nature of the pest, requiring collaboration and coordination amongst the concerned countries and international organizations engaged in controlling and managing it.

The specialized agency FAO, realized the importance of establishing the different regional commissions, which the Central Region Commission, (our commission) is one amongst the commissions established to control the desert locust. Now fifty years have lapsed since the Central Region Commission is established, the core issue however, is its impact in minimizing the damage due to desert locust. As a member and beneficiary we, believe the commission together with the member countries and donors have done a good job in significantly reducing the damage of the pest through early warning and early intervention in the control of the pest.

In Ethiopia, we are fully convinced that regional and international cooperation is vital in the sustainable control and management of migratory pests including desert locust, African armyworm, and grain eating quelea birds. In corollary with this, Ethiopia has committed herself to actively engage in the Desert Locust Control Organization for Eastern Africa-DLCO/EA, the Central Region Commission- CRC, and FAO/DLCC.

Lastly it is our wish to see a strong and more vibrant commission that coordinates the member countries activities in controlling the desert locust. On the other hand, more is to be desired in fulfilling members' obligations such as annual contributions.

Finally the Ministry of agriculture and Natural Resources takes this opportunity to renew its assurances of the highest consideration to the FAO Commission for Controlling the Desert Locust.

Regards,



**Wondirad Mandiro**  
State Minister





## Republic of Iraq

Republic of Iraq  
Ministry of Agriculture  
Minister Office



جمهورية العراق  
وزارة الزراعة  
مكتب الوزير

كلمة المهندس  
وزير الزراعة  
جمهورية العراق

بعد الجراد الصحراوي من أخطر الحشرات المعروفة باضرارها على المحاصيل الزراعية، إذ ان الحشرات تتخذ بمعدل ضعف حجم وزنها من التباكت يومياً، ويهدد الجراد الصحراوي العديد من البلدان (أكثر من ٦٠ بلد) في أفريقيا والشرق الأوسط. فيما يخص العراق لم يتعرض سابقاً الى غزو أو انفجار سكاني في اسراب الجراد الصحراوي بشكل كبير حيث يقع العراق ضمن حزام مناطق انجذاب الجراد ولذلك لم تكن هناك حملات المكافحة، الا انه وفي خمسينات القرن الماضي وكذلك في عام ١٩٨٧ تمكنت اسراب من الجراد الصحراوي من عبور الحدود العراقية السعودية مما دعا وزارة الزراعة العراقية الى القيام بمكافحته باستخدام الطائرات الزراعية ومن ذلك الحين زاد الاهتمام لضرورة وضع خطط تشمل تهيئة المستلزمات الضرورية لمواجهة اية حالات طوارئ في احتواء اخطار الجراد الصحراوي من خلال التخطيط المسبق والاعداد لحملات المسح والاستكشاف الدوري، كما شارك الطيران الزراعي العراقي في حملات المكافحة في بعض المناطق التي غزاها الجراد في المملكة الاردنية الهاشمية ودولة الكويت بعد طلب الاستعانة من تلك الدول في حينها، واصبحت الخطط تبني اعتماداً على المعلومات التي ترد عن طريق منظمة الاغذية والزراعة الدولية ويتم اعلام اجهزة الوقاية في الدوائر الزراعية في جميع المحافظات بهذه المعلومات بواسطة وحدة الجراد في دائرة وقاية المزروعات وفي حالة تطلب الموقف مزيداً من الحيلة والحذر يتم الابعاز الى فرق المسح للقيام بالاعمال الاستكشافية وخاصة في المناطق الحدودية باستخدام الاجهزة الحديثة كما يتم تأمين وسائط النقل والمعدات اللازمة لاحتمال القيام بالمكافحة وكذلك هامش احتياطي من المبيدات الحديثة لاستخدامها عند الحاجة لذلك، ان العلاقة المتبادلة بين وحدة الجراد وهيئة مكافحة الجراد في المنطقة الوسطى ومنظمة الاغذية والزراعة الدولية تعتمد على الاتصالات وتسليم التقارير الدورية حول التنبؤات بتحركات الجراد وتطورات المواقف فيما يتعلق بحالة الجراد الصحراوي والظروف الجوية واعمال المسح والمكافحة الجارية في البلدان الاخرى وتسليم المنشورات والنشرات العلمية وكذلك ادامة التواصل لحضور المؤتمرات الدولية والاشتراك في الدورات والورش التدريبية وموافاة الهيئة بآلية مستجدات تخص حالة الجراد الصحراوي داخل العراق.

وفي الختام نود ان نقدم الشكر والامتنان لكل الجهات الداعمة لبلدنا العزيز في مواجهة هذه المخاطر، امين زيادة التعاون والتنسيق لتحقيق تطلعاتنا الكبيرة في تحقيق الامن الغذائي والله الموفق.

المهندس

فلاح حسن زيدان اللهيبي

وزير الزراعة

جمهورية العراق

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بغداد - ساحة الأندلس

٧١٨٦١٠٧ / ٧١٨٦١١١ / ٧١٥٣٨١٥

## Hashemite Kingdom of Jordan



### المملكة الأردنية الهاشمية

كلمة معالي وزير الزراعة بمناسبة الذكرى الخمسين  
لتأسيس هيئة مكافحة الجراد الصحراوي في المنطقة الوسطى

يعتبر القطاع الزراعي في المملكة الأردنية الهاشمية من أهم القطاعات الإنتاجية والتي تسهم في توفير الأمن الغذائي والاجتماعي وتحقيق التنمية الشاملة. وتميزت المملكة بالموقع الجغرافي والذي وفر الخصوصية المناخية للعديد من المناطق الزراعية والتي جعلت القطاع الزراعي قادراً على تلبية إحتياجات الأسواق المحلية ومنافساً قوياً في الأسواق الخارجية.

وللقناعة المملكة بأن الحفاظ على هذا القطاع لا يمكن أن تتم بالجهود الوطنية فقط حيث يتجاوز الخطر الآفات المستوطنة إلى الآفات المهاجرة فقد شاركت المملكة ومن خلال وزارة الزراعة في 1967/2/21 في تأسيس هيئة مكافحة الجراد الصحراوي في المنطقة الوسطى والتي تعمل على تنسيق الجهود بين الدول لضمان التعاون في مجال مراقبة ومكافحة الجراد الصحراوي .

واستمرت الهيئة منذ ذلك التاريخ وعلى مدى عقود بدعم المملكة بجميع الإمكانيات المتاحة والتي إشتملت على المعدات ومشاركة الفنيين في الدورات شبه الإقليمية المتخصصة في مراقبة ومكافحة الجراد الصحراوي.

وقد تعرض الأردن في الأعوام 2004 و 2013 إلى غزو الجراد الصحراوي حيث وصل إلى المناطق الجنوبية والغربية من المملكة وشهد الأردن ولأول مره منذ ما يقارب من 60 عاماً تكاثر الجراد وتطوره في جميع المراحل خلال فترة استمرت أكثر من 3 أشهر ومهما كانت المسببات فإن حدوث هذه الحالة النادرة قد أثبتت بأن الجراد قادر على الوصول إلى الدول التي كانت وما زالت تعتبر من دول خط المواجهة الثاني في مكافحة الجراد الصحراوي ويسبب خسائر كبيرة على كافة أنواع الغطاء النباتي إذا لم يتراعى مع الاستعداد التام للقيام بعمليات المسح والمكافحة .

وقد كان لهيئة مكافحة الجراد الصحراوي في المنطقة الوسطى (CRC) ومن خلال منظمة الأغذية والزراعة (FAO) الدور المميز في الحد من انتقال هذه الآفة إلى المملكة والسيطرة على الأسراب التي وصلت من خلال التنفيذ الناجح لخطة الطوارئ التي تم إعدادها وتنفيذها من خلال الكوادر الوطنية المدربة والتي تم تأهيلها من خلال الهيئة على مدار الأعوام الماضية.

وإذا تعززت المملكة بالشراكة القوية مع الهيئة فاتها تسعد دائماً باستضافة جميع النشاطات التي يتم تنفيذها لإيمانها الكبير بالدور المميز الذي تقوم به الهيئة في دعم جميع الدول الأعضاء لمواجهة آفة الجراد الصحراوي.

ويسرني وفي الذكرى الخمسين لتأسيس هيئة مكافحة الجراد الصحراوي في المنطقة الوسطى أن نتقدم المملكة بالتهنئة لهيئة مكافحة الجراد الصحراوي في المنطقة الوسطى على الإنجازات التي حققتها الهيئة من خلال الخطط والبرامج الناجحة التي تم وضعها وتنفيذها خلال الأعوام الماضية والتي أسهمت في زيادة التعاون الإقليمي وتقديم الدعم الكبير لجميع الدول الأعضاء للحد من الإضرار الاقتصادية لآفة الجراد الصحراوي .

كما نتقدم بالشكر والتقدير لهيئة مكافحة الجراد الصحراوي في المنطقة الوسطى وإلى الأمين التنفيذي الدكتور مأمون العلوي وجميع العاملين بالهيئة على الدعم المستمر للمملكة في مكافحة الجراد الصحراوي متمنين لها مزيداً من التقدم والنجاح.

وزير الزراعة  
الدكتور عاكف الزعبي

## State of Kuwait



يسعدنا بمناسبة الذكرى الخمسين لإنشاء هيئة مكافحة الجراد الصحراوي في المنطقة الوسطى (CRC) ان نتقدم بخالص التهنية والتقدير الى الجهود والإنجازات المحققة على المستوى الإقليمي والدولي وذلك لإرساء مفهوم التنمية الزراعية المستدامة وتعزيز دورها في منظومة الأمن الغذائي وإبراز دور القطاع الزراعي في التنمية الاقتصادية والاجتماعية. ان انضمام دولة الكويت الى هيئة مكافحة الجراد الصحراوي للمنطقة الوسطى في ١٠ اغسطس ١٩٦٧م يؤكد على النظرة المستقبلية لحكومة دولة الكويت لأهمية الاستراتيجيات التي تضعها منظمة الفاو حيث قامت بإعداد استراتيجيات وخطط تنفيذية للحد من عبور وانتشاره هذه الآفة ، من خلال الاستعداد و اعداد خطة الطوارئ لمواجهة الجراد بالتنسيق مع الجهات المحلية لتوفير الآليات والمبيدات اللازمة والاستعانة بالكوادر الفنية المحلية و وضع الخطط اللازمة لتنظيم حملات المكافحة والتي تم تدريبها وتأهيلها في برامج التدريب المستمرة والتي تنظمها هيئة مكافحة الجراد الصحراوي ضمن خططها الى تنمية وتأهيل القدرات البشرية.

ان الجهود التي تقوم بها هيئة مكافحة الجراد الصحراوي في المنطقة الوسطى المستمر ساهم بشكل فعال للحد من تأثيرات هذه الآفة والتي اصبحت تهدد استقرار كثير من المجتمعات، وهذا ما نشهده في السنوات الاخيرة من قلت فورات الجراد الصحراوي عن ذي قبل وذلك لجهود هيئة مكافحة الجراد الصحراوي التابع لمنظمة الزراعة والاغذية في رصد حركة ونشاط الجراد في دول المنطقة والانذار المبكر في المكافحة والتوقعات المستقبلية لنشاط الجراد وذلك من خلال التقارير الدورية والتواصل المستمر مع الدول الأعضاء.

وبفضل هذه الجهود المتميزة والتي تقوم بها منظمة الاغذية والزراعة في الامم المتحدة والمنظمات التابعة خلال الأعوام الخمسين الماضية ساهمت في توفير البيئة الآمنة لدول المنطقة ومنها دولة الكويت فلها ولجميع العاملين عليها كل الشكر والتوفيق.

المهندس / فيصل سعود الحساوي

رئيس مجلس الإدارة - المدير العام

الهيئة العامة لشؤون الزراعة والثروة السمكية

المهندس فيصل سعود الحساوي  
رئيس مجلس الإدارة - المدير العام  
الهيئة العامة لشؤون الزراعة والثروة السمكية

## Lebanese Republic



### جانب هيئة مكافحة الجراد الصحراوي في المنطقة الوسطى (CRC) منظمة الأغذية والزراعة للأمم المتحدة

يسعدني في مناسبة الذكرى الخمسين لإنشاء هيئة مكافحة الجراد الصحراوي في المنطقة الوسطى (CRC) منظمة الأغذية والزراعة للأمم المتحدة في شباط/فبراير 2017، أن أقال إليكم احترام وزارة الزراعة في الجمهورية اللبنانية وتمنياتها باستمرار نجاح الهيئة وتحقيق أهداف شراكتها مع الوزارات والإدارات المعنية بمهمتها في دول المنطقة، لما لهذا الدور من أثر إيجابي في تحقيق الأمن الغذائي في منطقتنا.

لقد عرف لبنان ماضي زحف الجراد في الحرب العالمية الأولى، ولكتسب خبرات تقليدية في مكافحة الحشرة الفتك التي أدت في موجتها التاريخية عام 1914 إلى القضاء على المواسم الزراعية وإلى انتشار الجوع والموت جوعاً، ولم يعرف لبنان بعد ذلك موجات مماثلة لزحف الجراد.

وفي العقد الأخير، وصلت إلى لبنان أعداد قليلة من الجراد الصحراوي في ربيع العام 2012، عند وصولها منهكة لا تقوى على الطيران، ثم تعادها، وما لبثت أن ماتت ولم تعد وزارة الزراعة، التي تكفلح الأقات إلى مكافحة في حينه، وبالتالي فإن مكافحة الجراد الصحراوي لم تبدأ أصلياً ولم تلغز مجراها كمنظومة، ذلك أن لبنان لم يشهد موجة جراد صحراوي تستدعي المكافحة نظراً لمداهه ولبعده نسبياً عن مواطن تكاثر هذا الجراد.

وعلى الرغم من ذلك فإن وزارة الزراعة تولي اهتماماً خاصاً لمكافحة الجراد الصحراوي والتتسيق الدائم مع الهيئة لبناء الخبرات ووضع خطط الوقاية من جهة، والمواجهة في حال وصول الجراد الصحراوي وانتشاره في لبنان.

وبالإضافة إلى الخبرات التاريخية، وتطويراً لأساليب المكافحة التي كانت تقتصر على رش (Deltamethrin 2.5 EC) عند وجود حشرات نشطة وعلى الرصد والمتابعة عبر المراكز الزراعية ومراكز الأبحاث في المناطق اللبنانية كافة، فإن عدداً من كوادر الوزارة، مهندسين وفنيين، تدربوا بدعوة من الهيئة مشكوراً على مكافحة الجراد الصحراوي ويتابعون الإهتمام بالمكافحة وتطوير أساليبها وتقنياتها وأنوالها لمراقبة الخبرات المكتسبة تاريخياً، وهي تعود إلى أكثر من مئة عام ولا يمكن أن تغفل بالخبرات الحديثة التي تتطلع، بالتتسيق معكم وباستمرار التعاون إلى استدامة تطويرها وتبادلها بين المهندسين والفنيين المعنيين في دول المنطقة، وهذا ما حرص عليه في لبنان وقد شاركت المهندسات سبائلا جرجس وهدى الأخرس في أيلول 2015 في ورشة العمل عن الجراد الصحراوي وورسده ومكافحته في سلطنة عُمان وبنقلنا الخبرات المكتسبة لتأمين مستلزمات الاستعداد لمخاطر الجراد ووضع الخطط المسبقة للطوارئ وتدريب فرق الوزارة على تنفيذ الخطط عند الطوارئ.

وفي هذا الإطار، تتولى دائرة وقاية المزروعات في مصلحة وقاية الثبات في وزارة الزراعة في لبنان مهمة مكافحة الجراد الصحراوي وإعداد حملات المكافحة للآفات على أنواعها ومن ضمنها الجراد، ونعمل على استمرار التعاون بين فريق الوزارة والهيئة وعلى التواصل الدائم بين مصلحة وقاية الثبات والهيئة عبر لخطوطنا بكل ما يتعلق بانتشار الجراد في المنطقة، خصوصاً في مصر وفلسطين والأردن وسوريا، وبتمسيق الشراكة لاكتساب الخبرات وتبادلها والمشاركة في تدريب الكوادر في الدورات التي تنظمها الهيئة والتي تنسم بالمستوى المعالي من الحرفية والتقنية والعلم وقد عودتنا الهيئة على مثل هذا المستوى المبني على خبرات 50 سنة، أملاً للهيئة وكل الشركاء في المنطقة دوام التطور والنجاح.

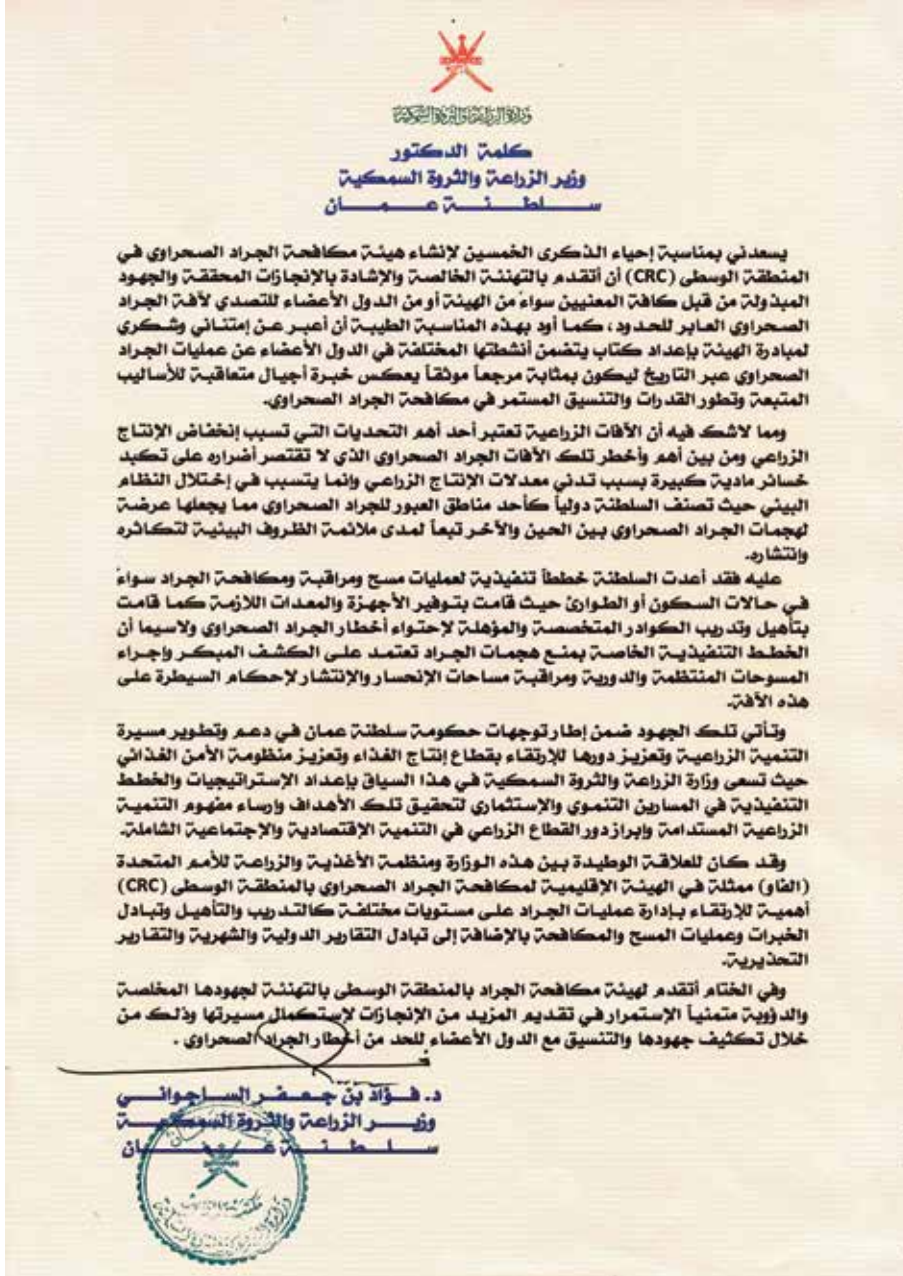
بيروت في ١١/١٠/٢٠١٧

وزير الزراعة

لكرم شبيب



## Sultanate of Oman





## State of Qatar



**كلمة سعادة/ محمد بن عبدالله الرميحي – وزير البلدية و البيئة**

**بمناسبة الذكرى الخمسين لإنشاء**

**هيئة مكافحة الجراد الصحراوي في المنطقة الوسطى (CRC)**

بمناسبة الذكرى الخمسين لإنشاء هيئة مكافحة الجراد الصحراوي في المنطقة الوسطى يسرني أن أتقدم بأسمى آيات التهاني متمنياً للهيئة المزيد من التقدم والإزدهار. وأنتهز هذه الفرصة لأعرب عن نقديري الخاص لعملاً حقته الهيئة خلال الخمسين عاماً المنصرمة من عمرها حيث لا يخفى على أحد الإنجازات العديدة التي حققتها الهيئة في مجال مكافحة الجراد الصحراوي. خاصة من منتصف عام 1997 عندما بدأ المكون الخاص بالجراد الصحراوي في نظام الوقاية من طوارئ الآفات والأمراض الحيوانية والنباتية العابرة للحدود والذي كان الهدف منه التقليل من مخاطر أوبئة الجراد الصحراوي في المنطقة الوسطى من خلال تصميم برنامج تعاوني شاركت من خلاله البلدان المتضررة والمنظمات الإقليمية والجهات المانحة ومنظمة الأغذية والزراعة (الفاو) في تطوير استراتيجيات مكافحة وقائية محسنة للحد من المخاوف المتعلقة بالأمن الغذائي في المنطقة الوسطى.

إننا إذ نهنئ الهيئة باحتفالها بالذكرى الخمسين لإنشاء هيئة مكافحة الجراد الصحراوي، نشتم الدور الكبير الذي تطلع به. ونشيد بالتعاون الكبير بين وزارة البيئة في دولة قطر والهيئة من خلال البرامج الموفرة مما أدى إلى تحسين القدرات في مجال إجراء عمليات المسح والمكافحة وتنظيمها. من خلال البرامج التدريبية للعاملين في هذا المجال، والتي تساهم بفعالية في بناء وتطوير القدرات للكوادر البشرية المختصة. حيث كان لتعاون الهيئة مع وزارة البيئة من خلال امدادها ببعض المعدات والآلات الرش ووسائل الاتصال للتدريب عليها فضلاً عن توفير كافة المعلومات الخاصة بالجراد الصحراوي وبشكل دوري ومستمر أكبر الأثر في أن تقوم إدارة الشؤون الزراعية بوزارة البيئة في قطر بأداء رسالتها في هذا الصدد بصورة مثلى. إن دولة قطر والتي انضمت إلى الهيئة في 1968/12/31م وكعضو فاعل في هيئة مكافحة الجراد الصحراوي في المنطقة الوسطى حريصة كل الحرص على المشاركة في كافة الجهود التي تقوم بها الهيئة والرامية لأداء دورها في مكافحة الجراد في المنطقة الوسطى وتأمّل في المزيد من التعاون والتنسيق لما يحقق الغايات المرجوة والمختشودة.

كما أنتهز هذه الفرصة لتهنئة السيد/ هوري اسغندوم رئيس الهيئة الحالي والسيد/ مأمون العلوي الأمين التنفيذي للهيئة وجميع ممثلي الدول الأعضاء في الهيئة بهذه المناسبة متمناً جهودهم وما تقدمه الهيئة من برامج عديدة في مجال مكافحة الجراد الصحراوي ونتطلع للمزيد من الإنجازات خلال السنوات القادمة.

**محمد بن عبد الله الرميحي**  
**وزير البلدية والبيئة**

160-ms-2-2016

## Kingdom of Saudi Arabia

الرقم  
التاريخ  
المشطوبة

وزارة الزراعة  
المملكة العربية السعودية



[FVE]  
مكتب الوزير  
١٠٢٠٠٠١٠٠

**كلمة معالي وزير الزراعة بالمملكة العربية السعودية بمناسبة الذكرى الخمسين  
لإنشاء هيئة مكافحة الجراد الصحراوي في المنطقة الوسطى التابعة لمنظمة الأغذية  
والزراعة للأمم المتحدة (الفاو)**

حقق القطاع الزراعي إنجازات هامة في مسيرة التنمية الزراعية بالمملكة العربية السعودية مما  
انعكس على دفع عجلة التنمية الشاملة، وهذا بفضل الله ثم بفضل ما يحظى به هذا القطاع من دعم  
سخي من حكومتنا الرشيدة أيدها الله.

وتحرص وزارة الزراعة على استدامة ما تم تحقيقه من مكتمبات في هذا القطاع الهام والسعي  
في تطويره والحفاظ عليه من خطورة بعض الآفات والتي من ضمنها الجراد الصحراوي، والذي يسبب  
خسائر اقتصادية للمزارعين وتأثيرها أيضاً على الغطاء النباتي في حالة عدم مكافحتها بالطرق  
العلمية الصحيحة، والتي تضمن التوازن في القضاء على الآفة مع عدم الإفراط في استخدام المبيدات،  
لتجنب الأضرار الصحية والبيئية.

ولهيئة مكافحة الجراد الصحراوي بالمنطقة الوسطى دور كبير وفعال في تعزيز التعاون بين  
الدول الأعضاء من خلال وضع الخطط والبرامج المتنوعة للتصدي والحد من انتشار وتكاثر الجراد  
الصحراوي داخل دول المنظمة ولضمان عدم انتقاله للمناطق المجاورة، لتلافي الأضرار الاقتصادية  
الكبيرة التي تسببها هذه الحشرة.

وبمناسبة الذكرى الخمسين لتأسيس هيئة مكافحة الجراد الصحراوي في المنطقة الوسطى  
يسرنا تهنئة الهيئة بهذه الذكرى السعيدة، تقديراً منا بدورها الفعال والإهام من خلال المساهمات التي  
قدمتها لوزارة الزراعة في المملكة العربية السعودية والتي كان من أهمها تزويدنا بتقارير عن  
تحركات أسراب الجراد ومواقع الإصابة في جميع الدول الأعضاء مع تدريب وتأهيل كوادرنا الوطنية  
العاملة في مجال الاستكشاف والمكافحة، وتوفير الخبراء المختصين لتقييم ومعايرة آلات وأجهزة  
المكافحة المستخدمة، في سبيل رفع كفاءة فرق العمل الميدانية.

ختاماً بأسمى وبأسمى وزارة الزراعة أتمنى التوفيق والمزيد من النجاحات للهيئة في مشاريعها  
المستقبلية، لتحقيق الأهداف التي من أجلها تم إنشائها. والله الموفق،،

وزير الزراعة

  
م. عبدالرحمن بن عبدالمحسن الفضلي

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## Republic of the Sudan

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**وزارة الزراعة والغابات**  
من ب: ٢٥٥ الخرطوم  
٧٧٨٨٠٠ - فاكس: ٧٧٩٣٥١

**Minister's Office** مكتب الوزير

Date: \_\_\_\_\_ التاريخ: \_\_\_\_\_  
Ref.: \_\_\_\_\_ المرقم: \_\_\_\_\_

**كلمة معالي السيد/ إبراهيم الدخيري- وزير الزراعة والغابات في العيد الخمسين لهيئة المنطقة الوسطى لمكافحة الجراد الصحراوي بمنظمة الأغذية والزراعة العالمية**

لنا عظيم اشرف والتقدير في أن ننقل لمنظمة الأغذية والزراعة العالمية و هيئة المنطقة الوسطى لمكافحة الجراد الصحراوي بالتهنئة الحارة والمباركة بمناسبة العيد الخمسين للهيئة ، والتي تم انشاءها من قبل الدول المُنْتَزعة بغزو الجراد في عام 1965 وبدأت نشاطها الفعلي في عام 1967، و للسودان كأحد الدول الأعضاء فضل كبير في تلك المسيرة، ونحن نؤمن تلك الجهود ونُدعم العمل الدولي المشترك في التحديات التي تواجه الزراعة وخاصة الآفات العابرة للحدود مثل الجراد الصحراوي.

يعتبر السودان من دول المواجهة وتمتد مساحة توالد الجراد الصحراوي فيه لأكثر من مليون ونصف المليون هكتار تقع في نطاق حزامين للتوالد الصيفي والشتوي. وتنسق هيئة المنطقة الوسطى مع الدول المانحة في كيفية مساندة الدول الأعضاء من أجل مكافحة هذه الآفة الخطيرة لتلافي الأثر الناجمة عن غزوها وإنتشارها. وننتهز هذه الفرصة لتتقدم بجزيل الشكر والامتنان للهيئة في أنها منذ عام 2013 م وحتى الآن قامت بتقديم المساعدة للسودان ممثلًا في الإدارة العامة لوقاية النباتات بوزارة الزراعة والغابات، للحصول على عدد من عربات الدفع الرباعي، واليات رش متطورة جدا ، ومعدات إتصال لاسلكي، ومعدات معسكرات، بجانب دعمها لعدد من الدورات التدريبية الإقليمية والمحلية ، ومساعدتها المتواصلة في دعم نظم المعلومات وتوفير المعدات اللازمة لها، ونحن نؤمن ذلك ونقدره جدا ونسعى لمزيد من التعاون والعمل المشترك.

في الختام أرجو أن أتقدم بالشكر الجزيل للدول الأعضاء بهيئة المنطقة الوسطى في تعاونها المستمر من أجل مكافحة الجراد الصحراوي وكذلك لكل ابناء الهيئة المتعاقبين منذ تأسيسها وحتى لحظة الاحتفال بالعيد الخمسين للهيئة.

ولكم منا جزيل الشكر والتقدير

معالي السيد/ إبراهيم الدخيري  
وزير الزراعة والغابات



## Syrian Arab Republic



**كلمة وزارة الزراعة والإصلاح الزراعي في الجمهورية العربية السورية بمناسبة الذكرى الخمسين لإنشاء هيئة مكافحة الجراد الصحراوي في المنطقة الوسطى بمنطقة الأغذية والزراعة للأمم المتحدة**

تتشرف وزارة الزراعة والإصلاح الزراعي أن تتقدم بأحر التهاني لهيئة مكافحة الجراد الصحراوي في المنطقة الوسطى بمناسبة حلول الذكرى الخمسين لإنشائها والتي حققت من خلال نشاطاتها وبرامجها المختلفة تطوراً كبيراً في مكافحة حشرة الجراد الصحراوي والحد من إنتشارها بشكل كبير.

إن أفة الجراد الصحراوي تعتبر من أخطر الآفات الاقتصادية وأكثرها تهديداً للغذاء البشري وذلك لأنها تمتلك إمكانية التحرك ضمن أسراب من الممكن تكاثرها إلى مسافات بعيدة، وهذا ما يميزها بقدرة خطيرة تؤثر على الأمن الغذائي.

لقد تعرضت الجمهورية العربية السورية خلال الأعوام (1915-1962) لحدة غزوات من حشرة الجراد الصحراوي، ووقرت الخسائر حسب منظمة الأغذية والزراعة للأمم المتحدة (FAO) بـ 15 مليون ليرة سوريا حتى أنها وصلت في عام 1955 إلى 40 مليون ليرة سورية، وخلال تلك الفترة كانت الحكومة تكلف الأهالي بجمع الجراد ضمن أكياس ثم تقوم بحرقه.

في عام 1988 في بداية كانون الأول (نيسبر) وصلت مجموعات منهكة من الجراد الصحراوي إلى الساحل السوري وضطت مساحة 15 هكتار في اللاذقية و 300 هكتار في طرطوس وأعداد متفرقة في بعض المناطق الأمر الذي إستدعى إجراء عمليات مكافحة باستخدام آلات الرش الأرضية المحمولة على السيارات بالإضافة إلى استخدام الطيران الزراعي، مما دعا الحكومة إلى الإهتمام بتأمين كافة المستلزمات اللازمة لمكافحة هذه الآفة وتقديم الدعم المناسب، نظراً للأهمية الكبيرة التي يتمتع بها القطاع الزراعي في سورية.

وبهذا الخصوص حشدت وزارة الزراعة والإصلاح الزراعي كافة الطاقات البشرية والمادية لمكافحة هذه الآفة، وصلت على تأمين كافة المستلزمات اللازمة لذلك إستعداداً لأي غزو محتمل، فقد قامت بتأمين مبيدات مستخدمة في تلك تفتيات الرش الأرضي والطيران الزراعي، حيث كان يتوفر لدى الوزارة التجهيزات الأرضية اللازمة لمواجهة أي طارئ أو هجوم من هذه الحشرة والتي هي عبارة عن: مرشات محمولة على السيارات - مرشات ظهرية موزعة في أغلب المحافظات السورية.

نتيجة للتطوّر والاهتمام ومنذ عام 2011 هناك صعوبة في إجراء أي عمليات للجراد، علماً بأن وزارة الزراعة والإصلاح الزراعي ممثلة بمديرية وقاية النبات هي الجهة المسؤولة عن تنفيذ هذه المهام، حيث تضم أقسام لإدارة الآفات وآلات المكافحة بالإضافة إلى وحدة جوية تعني باستخدام الطيران الزراعي، كما يتبع للمديرية دائرة وقاية نبات في كل محافظة من محافظات القطر. وتقوم الوزارة بعمليات المتابعة والمراقبة المستمرة لحالات تطور وتحرك الجراد في كافة مناطق الإنتشار، من خلال وسائل الإعلام وال نشرات الدورية الصادرة من منظمة الأغذية والزراعة للأمم المتحدة وتقارير هيئة مكافحة الجراد الصحراوي في المنطقة الوسطى.

علماً إن الجمهورية العربية السورية انضمت إلى الهيئة في 1968/12/3م وكأحد الدول الأعضاء في هيئة مكافحة الجراد الصحراوي في المنطقة الوسطى ملتزمة بتنفيذ بنود هذه الاتفاقية، من خلال حضور كافة الفعاليات المرتبطة بعملها، إضافة إلى المشاركة في الدورات التدريبية وحلقات العمل التي تعقدها الهيئة في مكافحة هذه الآفة في الدول الأعضاء.

وفي هذا الصدد نتوجه بالشكر الجزيل لهيئة مكافحة الجراد الصحراوي في المنطقة الوسطى للجهود المبذولة والمتابعة الدقيقة لنشاط الجراد وتزويد الدول الأعضاء بأهم التفتيات الحديثة بكافة أشكالها والتي أثمرت في مكافحة فعالة للجراد في مواطن التكاثر وقبل الإنتشار.

وزير الزراعة والإصلاح الزراعي

المهندس أحمد فتاح القادري



## United Arab Emirates

UNITED ARAB EMIRATES  
MINISTRY OF CLIMATE CHANGE  
& ENVIRONMENT



الإمارات العربية المتحدة  
وزارة التغير المناخي  
والبيئة

### كلمة وزارة التغير المناخي والبيئة

#### بمناسبة

الذكرى الخمسين لإنشاء هيئة مكافحة الجراد الصحراوي في المنطقة الوسطى  
بمنظمة الأغذية والزراعة للأمم المتحدة

يسر وزارة التغير المناخي والبيئة بدولة الإمارات العربية المتحدة أن تقدم خالص التهنية لهيئة مكافحة الجراد الصحراوي في المنطقة الوسطى (CRC) بمناسبة الذكرى الخمسين لإنشائها، وأن تشيد بالجهود التي بذلتها ولا زالت تبذلها من أجل الحد من التأثيرات السلبية لطاهرة الجراد الصحراوي وتنسيق الجهود الإقليمية الموجهة للوقاية منها ومكافحتها.

لقد انضمت دولة الإمارات العربية المتحدة لهيئة مكافحة الجراد الصحراوي في المنطقة الوسطى (CRC) في عام 1974 لإيماتها بالتأثيرات السلبية الخطيرة التي تشكلها حشرة الجراد الصحراوي على الاقتصادات الوطنية وعلى الأمن الغذائي في منطقة تضم أكثر من ثلاثين دولة وتمتد من الهند شرقاً حتى المغرب غرباً ومن البحر المتوسط شمالاً حتى الصحراء الكبرى جنوباً.

ومع أن البعد النسبي لموقع دولة الإمارات العربية المتحدة الجغرافي عن مناطق تكاثر وتوالد الجراد التقليدية جعلها قليلة التعرض لهجماته، إلا أن دولة الإمارات كانت حريصة على الانضمام إلى الهيئة انطلاقاً من إدراكها لأهمية التعاون الإقليمي والدولي في التصدي لتقضايا والمشاكل العابرة للحدود، ومن بينها قضية الجراد الصحراوي. ولأهمية اتخاذ الإجراءات الوقائية والاحترازية لتفادي أو الحد من التأثيرات الاقتصادية والاجتماعية والبيئية الخطيرة لهجمات الجراد الصحراوي التي شهدنا أمثلة لها في مناطق عدة في الإقليم، خاصة في سبيليات وثمانينيات القرن الماضي.

وقد قامت دولة الإمارات العربية المتحدة باتخاذ مجموعة من الإجراءات في هذا المجال تركزت بشكل أساسي على بناء القدرات، الفنية والبشرية، في مجال الرصد والإنذار المبكر، وإدماج مكافحة الجراد الصحراوي في خطة الطوارئ الوطنية، والتوعية بتأثيراتها الاقتصادية والاجتماعية والبيئية، لاسيما ذات الصلة بالأمن الغذائي.

وأود أن أعتمد هذه الفرصة لأشيد بالعلاقة الطويلة والتعاون البناء بين دولة الإمارات العربية المتحدة، ممثلة بوزارة التغير المناخي والبيئة، ومنظمة الأغذية والزراعة، ممثلة بهيئة مكافحة الجراد الصحراوي في المنطقة الوسطى في المجالات المختلفة كتبادل المعلومات والتقارير وبناء القدرات.

لقد نجحت الهيئة، بفضل تطوير نظم الرقابة والتعاون المشترك بين دول المنطقة، في التصدي لأفة الجراد الصحراوي وتقليل كلفتها الاقتصادية ومنع العديد من التفشيات الكبرى في السنوات السابقة. وهذه النجاحات التي تحققت تولد الثقة في قدرتنا، كأعضاء في الهيئة، على مواجهة التحديات المستقبلية التي تواجه دول الإقليم.

ولحن إذ نعرب عن دعمنا للهيئة ومساندتها لخططها وبرامجها، فإننا نجدد التأكيد على أهمية وحسوبة الدور الذي تقوم به، خاصة في بلدان خط المواجهة الامامية ونفتنا في قدرتها على مواجهة التحديات المستقبلية واستدامة النجاحات التي تحققت وتعزيز مساهمتها في تحقيق أهداف التنمية المستدامة الجديدة التي أقرتها الجمعية العامة للأمم المتحدة في عام 2015، خاصة ذات الصلة بمكافحة الفقر والجوع وتعزيز الأمن الغذائي العالمي.

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الإمارات العربية المتحدة

## Republic of Yemen

Republic of Yemen  
Ministry of Agriculture & Irrigation  
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الجمهورية اليمنية  
وزارة الزراعة والري  
الوكيل

Ref: 6235

كلمة وزارة الزراعة والري بمناسبة الذكرى الخمسين لإنشاء هيئة مكافحة الجراد الصحراوي  
في المنطقة الوسطى بمنطقة الأغنية والزراعة التابعة للأمم المتحدة

لقد كانت الجمهورية اليمنية من الدول الأولى التي انضمت إلى هيئة مكافحة الجراد في المنطقة الوسطى منذ تأسيسها لأيماتها بأهمية العمل التعاوني على المستوى الإقليمي والدولي في مجال مكافحة الجراد وكون الجمهورية اليمنية تعتبر من دول المواجهة الرئيسية للكثير الجراد حيث تشمل أراضيها مناطق للكثير الجراد خلال فصلي الشتاء والصيف وكذا تعتبر منطقة عبور لأسراب الجراد من دول الشرق الأفريقي ومن دول غرب آسيا وحرصاً منها على أهمية التعاون المشترك في مجال الحد من أخطار هذه الآفة العابرة للحدود فقد كانت الجمهورية اليمنية حريصة وسابقة على الانضمام للهيئة منذ بداية تأسيسها حيث كانت تلعب دوراً فاعلاً في كثير من أنشطة الهيئة كما إن الجمهورية اليمنية قد استفادت من الهيئة في تنمية قدراتها البشرية من خلال تأهيل الكوادر الوطنية وكذا توفيرها للكثير من وسائل المكافحة والرصد والإسهام في تشجيع التعاون بين دول الإقليم.

كما أن الهيئة قد حققت الكثير من الإنجازات للدول الأعضاء ومنها اليمن من خلال دورها الهام أثناء تنفيذ برنامج منع طوارئ الجراد في المنطقة الوسطى والذي عمل على تعزيز قدرات وحدات الجراد في المنطقة الوسطى سواء في مجال تبادل المعلومات وسرعة تداولها وتنسيق إستراتيجية المكافحة الوقائية التي عملت على تفادي أخطار تكون الأسراب وسرع انتقالها إلى المناطق الزراعية وتفاذي ما تحدثه من خسائر في المحاصيل الزراعية.

وفي هذه المناسبة يسرنا أن نقدم للهيئة لهيئة مكافحة الجراد في المنطقة الوسطى بمناسبة الذكرى الخمسين لتأسيسها كما نعبر عن تقديرنا للجهود الطيبة والبناءة التي تبذلها الهيئة والدور الفعال في الحماية للثروة الزراعية من خلال التصدي لأخطار الجراد في المنطقة والعمل على تعزيز التعاون بين الدول في مجال مكافحة الجراد الصحراوي.

كما نتقدم بالشكر والتقدير للهيئة لما قدمته من مساعدات في المجالات المختلفة والذي كثر له الدور الكبير في تعزيز قدرات مكافحة الجراد في الجمهورية اليمنية ونخص بالذكر إعادة تأهيل مركز مراقبة ومكافحة الجراد الصحراوي.

وفي الختام نتمنى للهيئة مكافحة الجراد في المنطقة الوسطى التوفيق والنجاح في جهودها المستتابة لتعزيز التعاون بين الدول الأعضاء والعمل على حماية الثروة الزراعية في الإقليم.

وكيل الوزارة لقطاع الخدمات الزراعية

د. محمد يحيى الفت



Ethiopia plagued by Desert Locust swarms in 1958

©NHM/UK





A driver of the Middle East Anti-Locust Unit during the locust control operations on the Arabian Peninsula in 1945



# 1. The history of the Commission



*"Someone flies up,  
I fly up from you, O! men;  
I am not for the earth, I am for the sky.  
O! you local god of mine, my double is beside you,  
for I have soared to the sky as a heron, I have kissed the sky as a falcon,  
I have reached the sky as a locust which hides the sun."*

(An ancient Egyptian pyramid text translated into English by R. O. Faulkner)

## 1.1 Introduction

**T**he story of FAO's Commission for Controlling the Desert Locust in the Central Region (CRC) cannot be told without also divulging the tale of its protagonist, the Desert Locust, *Schistocerca gregaria* (Forskål), and the mysteries that surrounded it when mankind first came into contact with this creature. We must also mention the men and women who contributed to understanding the secrets of this fascinating but dangerous insect.

The Desert Locust is considered as one of the ten most devastating pests of crop production in the world. People not only in Africa, the Near East and Asia but also at times in Europe, fear locusts as a terrible menace, seemingly coming from nowhere, and bringing severe hardship upon humanity.

But was this always the case? Locusts existed already long before the human race emerged. The origin of the Desert Locust dates back several millions of years, long before modern humans evolved in the middle Palaeolithic period (about 400 000 years ago) and started colonizing the world about 100 000 years ago. In those early days, locusts coexisted alongside all other living creatures including our ancestors without causing any harm. Most likely in these days people even embraced locusts as a welcome supplement to their normal diet.



Source: Virtual fossil museum

A 120-million-year-old locust fossil found in Liaoning Province in northeast China

This coexistence changed dramatically when our ancestors discovered the art of cultivating wild cereals such as wheat, barley and lentils some 11 000 years ago in the area called the Fertile Crescent, stretching from Upper Egypt to Mesopotamia (Iraq). Here, the first Neolithic farming settlements developed between the Jordan and Euphrates rivers around 9000 BC. The discovery of agriculture drastically transformed human behaviour from a nomadic to a more settled lifestyle. Growing crops and storing the harvest allowed people to secure their food supply, boosted civilization and caused human populations to grow. The additional food did not only significantly improve the overall living conditions of people, but also attracted other organisms such as locusts and rodents. As the first pests of agriculture, they could put all human efforts at stake. It is thus hardly surprising that locusts are deeply engraved in human memory.

## **1.2 The first 3 400 years (1700 BC–1700 AD)**

**W**hen locust plagues are mentioned in historical records, we presume they refer to the Desert Locust but we cannot always be sure because early writers did not have the skills to distinguish between the various locust and grasshopper species. But one of the most famous and ancient references dates back to about 1600 BC and is contained in the Biblical account of the Ten Plagues of Egypt:



A memory of the eighth biblical plague:  
Locust swarms over Cairo on November 17, 2004

“... and when it was morning the east wind brought the locusts ... the locusts went up over all the land of Egypt, and rested in all the coasts of Egypt. ... Before them there were no such locusts as they, neither after them shall be such. For they covered the face of the whole earth, so the land was darkened, and they ate every herb of land and all the fruit of the trees which the hail had left; and there remained not any green thing

in the trees, or in the herbs of the field, through all the land of Egypt. ... A mighty strong west wind, which took away the locusts, and cast them into the Red Sea; there remained not one locust in all the coasts of Egypt.” (Exodus 10,13ff).

Although the locust invasion is referred to in the Bible as the Eighth Plague, there are almost no portraits of locusts existing from ancient Egyptian days. Only harmless grasshoppers, probably solitary locusts, dwelling in full harmony with their neighbourhood are depicted in Egyptian reliefs and frescoes. The reason might be an unwillingness to portray a bad omen. Only one text from the Nineteenth Dynasty (1307–1196 BC) refers to locusts as part of the usual peasants’ hardship. Nevertheless, locust swarms occurred almost continuously and regularly in the Near East and parts of Africa throughout the centuries.



Source: [www.sacred-destinations.com](http://www.sacred-destinations.com)

A relief of the mastaba of Mereruka, the vizier to the pharaoh Teti II in Saqqara, Egypt (ca 2300 BC)

Locust plagues have been recorded on the monuments of Nineveh and Babylon during the reign of the King Zimri-Lims of Mari in 1700 BC when locusts completely destroyed all crops around Quttunan. In 1220 BC, Sumerian records tell us that locusts destroyed crops in the Habur zone. From royal correspondence during the reign of King Sargons II in 710 BC, we know of locust invasions in the areas of Assur and Kalhu (Nimrud), the heartland of the Assyrian Empire south of the river Sinjar and around the Upper Tigris. The letters contain royal instructions on how to react to a locust plague and give the impression of being the first record of an organized locust control campaign. Because of the sheer numbers of locusts in a plague, the traditional control measures of collecting and eating the locusts were dropped in favour of immediate killing tactics and royal troops were ordered into the war against the locusts.

“The royal confidante, my Lord, has sent to me, [was saying] as follows: Kill the locusts! We have so many gathered as they were. None has touched the harvest. Who belongs to the King, my Lord, has destroyed them. Harvests across the country of the King, my Lord, are in the best condition.

Tab-Silli-Esarra, the governor of Assur, wrote twice on this matter to the King, and he said: “What the King, my Lord, wrote to me: To kill grasshoppers, go to Me-tabute, to Amantu and as far as Kassappa! Here in the country are the locusts [everywhere] between [the river and the cities] in large numbers.” Unfortunately, the text then stops. It is unclear whether the governor of Assur followed the royal orders or not, but the text suggests that the central government did not handle the locust problem restrictively and issued instructions across the usual administrative boundaries. Even in those

early days, overcoming regional self-interest as an important obstacle to controlling transboundary threats like locust swarms was recognized as the key to success. It is not for nothing that also FAO and the Commission encourage cooperation among affected countries and across national boundaries. A second letter of the governor of Assyria says: “With reference to the locusts the King, my Lord, wrote to me: Write, there where the locust laid eggs fumigate [the areas] with juniper powder! At the time [the larvae] come out they should be destroyed! By the time the letter of the palace had not yet reached me, I already gave the following order to the cities and villages: [The areas] where the locusts have laid eggs, fumigate with juniper powder! At the time they come out, we will destroy them.”



An Ethiopian farmer “grabbing a Desert Locust by its teeth”

This is the first mention of control measures being aimed not only against adult locusts, but also targeting the egg pods and the hatching hoppers by using special substances “To grab the locust by its teeth.” The Assyrian kings were not only far ahead as far as locust control strategies were concerned, but they also tried to prevent catastrophes such as locust plagues through information collection by advising scholars to interpret astronomical and terrestrial signs from watching the skies and keeping their eyes open for any kind of unusual event.

In 125 BC, locust swarms invaded the kingdom Numidia [northern Algeria] and the Cyrenaica [eastern Libya] as well as regions to the south. The Roman historian Titus Livius recorded that locusts appeared “in a great swarm in Africa when hurled into the sea by the wind and cast up by waves, they produced by their unbearable stench and deadly effluvium a serious plague among livestock at Cyrene [an ancient Greek colony in Libya].” These swarms came from the south and flew to the northeast. Strong westerly winds were blowing and many swarms were swept out into the Mediterranean Sea. It is recorded that about 800 000 people died as a result of this plague.

Locust invasions must have been frequent in Syria, Arabia and Egypt during the Rashidun Caliphate (632–661 AD). It was recorded how the Caliph Umar ibn Al-Khattab (583–644 AD), who missed the locust swarms during one year of his reign, sent out messengers to Yemen, Arabia, Syria and Iraq in order to find out what had become of the locusts. The messenger to the Yemen returned with a handful of locusts and the Caliph was relieved that the world was still in a good order, because a legend said: “... God has created a thousand of nations of creatures; six hundred of them in the sea and four hundred on land, and that the first one to perish out of them will be locusts, which, when they perish will be followed by other nations like a string of strung pearls when the string is cut.”

The account of Caliph Umar may sound astounding in the sense that locust swarms were considered as a blessing rather than a threat. This is not surprising given the fact that even today locusts are welcomed as food in many nomadic societies, and that heaps of locusts are sold as a delicacy in local markets across the Sahel of West Africa and on the Arabian Peninsula. It is thus not unusual that at times even today national locust control teams run into disputes with local locust hunters.



Assyrian relief stone panel of the southwest palace of Nineveh (ca 700 BC)



A Bedouin consuming locusts (1944)

An illustration on a relief from King Sennacherib’s West Palace of Nineveh in modern-day northern Iraq shows that the consumption of locusts was usual at the Assyrian court. It displays two courtiers with skewers of roasted locusts in their hands and indicates that they were consumed as titbits in court. Locusts were also sometimes ground to a powder, which has a long shelf life and was therefore well-suited as food for long journeys or as a winter reserve. It is also reported that when John the Baptist withdrew into the desert he sustained himself on locusts and honey. Modern people may say this is typical behaviour of a person living as an ascetic or hermit. From the perspective of John’s contemporaries, it was nothing unusual but a testimony that God cares for His own people even in the desert.



But for most people living in agricultural areas, the sudden appearance of locust swarms was perceived as a true punishment of God causing “Pestilence and death.” In the Holy Quran, for example, locusts are referred to in verse (7:133) of chapter (7) *sūrat l-a’rāf* (The Heights): “So We sent upon them the flood and locusts and lice and frogs and blood as distinct signs, but they were arrogant and were a criminal people.”

In 1523, the Portuguese delegate to Abyssinia (Ethiopia), Father Francisco Alvares, reported “... a multitude of locusts which are in the country, and of the damage they do, and how we made a procession, and the locusts died.”



A locust swarm invading the Jigjiga region, Ethiopia (1958)

He told his Embassy: “In these parts and in all of the dominions of Prester John [the supposed King of Abyssinia] there is a very great plague of locusts which destroy the fresh crops in a fearful manner. Their multitude, which covers the earth and fills the air, is not to be believed; they darken the light of the sun. I say again that it is not a thing to be believed by anyone who has not seen them. ... Most of the priests of the town came to ask me to give them some remedy for it. I answered that I did not know of any remedy, except to commend ourselves to God, and pray Him to drive the plague out of the country. ... This country was entirely covered with locusts without wings, and they said these were the seed of those, which had been there and destroyed the country, and they said that as soon as they had wings, they would at once go and seek their country. ... I saw men, women and children, seated shock-struck amongst these locusts.”

Besides prayers and processions, Father Alvares wrote a manifesto, exhorting the locusts “under pain of excommunication, to move off within three hours, and betake themselves to the sea ... and if they fail to do this, the birds of the air and beasts of the field, hailstorms and tempests were called upon them to destroy them.” This appeal

to the perhaps finer senses of the insects was not in vain. The “Amabatas” (locusts) disappeared but left a devastated country behind!

The next famine caused by locust invasions in Abyssinia began around 1625 and lasted for three years with particularly serious consequences for the northern provinces. The first invasion was described by the Jesuit Jerome Lobo. He tells us of “... crowds of grasshoppers which fly in such numbers from the desert, that the sun is hid and the sky darkened.” He added that: “When this plague appears, nothing is seen through the whole region, but the most ghastly consternation; or heard but the most piercing lamentations; for everywhere they fall, that unhappy place is laid waste and ruined; they leave not one blade of grass, nor hopes of harvest.”



A settling Desert Locust swarm in Ethiopia (1959)

In 1626, Abyssinia became victim of a second invasion and the Jesuit, Thomas Barneto, simply stated that the insects arrived in the Fremona area (Tigray) and “destroyed everything.” But as if this was not enough, a third invasion coming from a land called “Cabesa” in August 1627 described by Almeida, who reported: “In Tegré the plague was so terrible that it depopulated some provinces, especially that of Bure which is near the Red Sea ... and also the lands of the Hamasens and the district of Agame suffered much; Bure remained totally destroyed because there were already two years during which this plague oppressed those lands ... The cattle were exterminated and the people perished from sheer hunger.” The extent of this plague and the misery it produced also found its expression in the Acts of King Gabra Masih II.

In an early seventeenth-century manuscript discovered in the monastery of Gundi Gundi in Tigray, it is stated that during the reign of King Susneyos there “... came locusts and laid waste the whole land of Ethiopia from end to end. And there was great famine and disturbance the like of which never happened before. The whole



land was in turmoil. One [man] rose against the other, and man ate the flesh of his fellow man. The famine was severe for seven years. Men and all animals perished. ... The holy and blessed Abuna Gabra Masih was sorrowful and greatly tormented. He also wept for his children far and near because they did not eat meat nor drink milk nor own property ...”

Another seventeenth-century famine caused by a locust plague in Abyssinia is recorded from the reign of King Fasiladas (1632–1667) that began in 1634 when “... a horrible [locust] plague invaded nearly the whole region and the King was obliged to change the seat of his palace to another place. ... the great swarms of locusts, which, entering through Bure and other neighbouring provinces, moved down ... , brought with them hunger as they usually do, followed by such scarcity and shortage of crops that many people died from sheer hunger.”



An Ethiopian farmer in the midst of a Desert Locust swarm (1978)

### 1.3 The first discoveries (1700–1900)

From around 1700 onwards more records of locust observations became available although these reports were far from complete. In approximately 1720, locusts were reported in Yemen and Arabia. The swarms were present in these areas for several successive years. From 1744 until 1752, Abyssinia was once again subject to more locust invasions and, as a result, a further great famine broke out. A contemporary chronicle stated, “... they [the locust swarms] covered the land like a fog” and “devoured all the grain.”

In December 1761, a large swarm from the Libyan Desert reached Cairo in Egypt. In May 1762, huge swarms crossed the Red Sea and invaded the Mocha region in Yemen. From there, some swarms turned back to the Red Sea while others continued to fly eastwards towards the mountain districts. In November 1762, swarms that crossed the Red Sea reached Jeddah. In early July 1763, locusts were encountered in the Yemen Highlands near Jebel Sumara and Jerim.

At that time, the Swedish naturalist Peter Forskål, a former student of Carl Linnaeus, was visiting Yemen and scientifically described the Desert Locust, hence the name *Schistocerca gregaria* (Forskål). Numerous swarms were present between Sana’a and Beit el Takih but, by the end of July 1763, the swarms had eventually dispersed because of violent storms and heavy rainfall. Unfortunately, Forskål fell ill with malaria and died in July in Yemen. He was just 31 years old.



Source: Wikipedia

Peter Forskål (1732–1763)

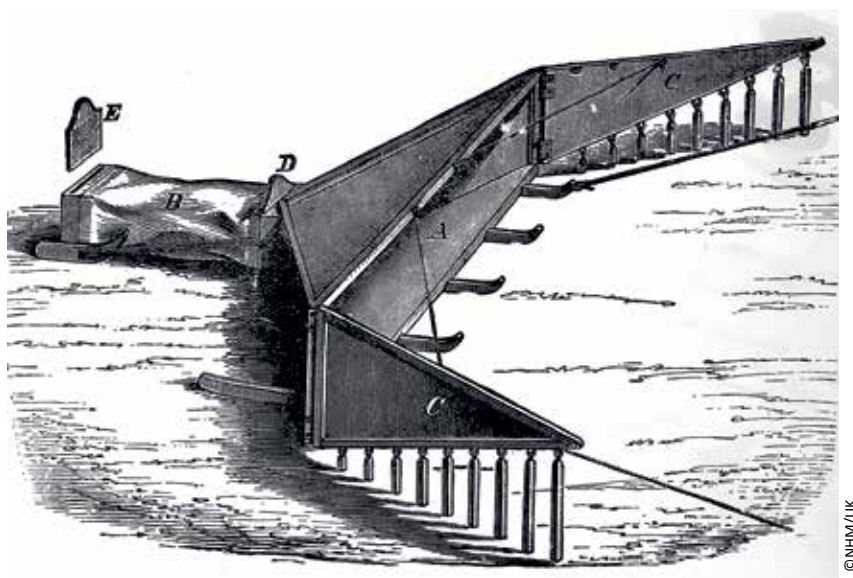
During 1811 and 1813 locust swarms appeared almost every year in the Sinai Peninsula and Palestine. They seem to have arrived from the direction of Aqaba about the end of May 1811. In April 1812, dense swarms were observed settling in Palestine and huge swarms of locusts moved south towards Upper Egypt in spring 1813. In May 1818, a locust swarm was observed near Chobak in Palestine that continued towards Gaza. Anglo-Egyptian Sudan was also invaded in 1813 and crops were completely destroyed in the Nile Valley between Berber and Shendi. In June 1814, swarms of large red and yellow locusts were reported from the Taka Mountains near Kassala, Sudan.

In April 1833, numerous swarms of red-coloured locusts were encountered in the Syrian Desert between Baghdad and Damascus and used as food by the inhabitants. In 1864 and 1865, Syria and Palestine experienced further invasions of locust swarms. In March 1865, very large swarms arrived from the south and flew north infesting Jaffa, Sada and Beirut regions, and hopper bands destroyed all the vegetation along

the river Jordan. In April, yellow swarms were observed at Jebel Musa in the Sinai Peninsula flying northwest. It was recorded that it took them three days to pass over. Also in 1865, Syria suffered from a severe invasion as swarms moved towards the northwest, crossed the Euphrates River to enter Aleppo district and then spread to the town of Al Bab.

Towards the end of October 1869, an immense swarm of locusts was reported in the Gulf of Aden. The steamship “Euphrates” encountered this northeast-flying swarm first some 25 km off of Socotra Island and it continued until the steamer reached Aden, a distance of nearly 900 km.

During the reign of the Chaliph Abdallahi ibn Muhammad (1885–1898) and the time of the British colonial Mahdist War in Sudan, a locust plague of classical proportions hit the Nile Valley in 1889 with such devastation that the “... locusts scarcely left enough grain for even the mice to scavenge.”



The Riley Locust-Catcher, USA (1877)

In November 1889, the British steam ship “Golconda” encountered a huge swarm of red-coloured locusts in the Red Sea near the Great Hanish Islands off the coast of Yemen. The swarms were seen flying northeast towards the Arabian shore. In June of the following year, the steamer “Yang-Tse” passed through masses of dead locusts floating on the water during 300 miles of her course in the Red Sea. In August 1890, the steamer “Rome” encountered huge swarms along the southern Arabian coast in the vicinity of Aden and for two subsequent days after entering the Red Sea.

Also in 1890, there was a serious invasion of locust swarms in Palestine and Syria. By May 1891, the swarms crossed the Euphrates and invaded the Vilayet [district] of Aleppo. In 1892, clouds of locusts appeared in the Jericho district of Palestine

and extensively damaged wheat and barley fields. Locusts were reported from Iraq in approximately 1890. The swarms flew northeast from the Kuwait frontier region, arriving late in the year and destroyed all the summer crops. In April 1891, numerous dead Desert Locust were discovered between Mahawil and Musseyib in the Euphrates valley.

In 1891, there was a heavy invasion of Egypt reportedly by Desert Locusts. Several swarms arrived from Libya in April, entering between Girgeh in Upper Egypt and the Mediterranean Sea. The locusts copulated upon arrival and laid eggs mainly on the sandy islands along the course of the Nile and on the west bank of the river. The Nile Valley was then overrun in April-May and reports of locusts arrived from Cairo, Talah, Choubiah and Kalioubieh. In June the young swarms reached Assiout and Alexandria. In 1899, Desert Locusts appeared in Sudan and in subsequent years until 1917. The swarms first appeared in May and breeding began in July and August. By October, the next generation was ready for flight. During the winter months, breeding took place on the Red Sea coastal plains. Swarms continued to be reported during 1901, 1902 and 1903.

Despite more frequent accounts of locust observations and those made by explorers in previous centuries, the origin of locust plagues remained a mystery. As the swarms often arrived from across the sea, people believed locusts emerged from the sea itself. They did not realize that the seemingly insignificant little grasshoppers found in scarce numbers in the field from time to time could develop into something completely different once ecological conditions allowed.

The only solution appeared to be invoking prayers for the Almighty's prevention of the coming disaster and for farmers to work hard and dig defence trenches so the seething creatures could be driven into them, burned and buried. For centuries, defensive methods were based on superstition and trial-and-error. Fortunately, people started to think of more rational methods and developed increasingly more effective locust control techniques.



Mechanical locust control by digging trenches and burying hoppers in Eritrea (1945)

In the United States of America for example, engineers constructed wooden machines dragged by horses to fight the locust menace. This method was used in 1875 when enormous swarms of Rocky Mountain Locusts invaded the midwestern United States of America. It was not until 1885 that poison baiting with sodium arsenate was first applied against locusts, thus paving the way towards more advanced control techniques.

## 1.4 Pioneering the fight against locusts (1900–1950)

*"The locust invasion started seven days ago and covered the sky.  
Today it took the locust clouds two hours to pass over the city.  
God protect us from the three plagues: war, locusts, and disease,  
for they are spreading through the country.  
Pity the poor."*

(Ihsan Hasan al-Turjman, an Ottoman soldier, diary entry for March 29, 1915)

The twentieth century represented a huge paradigm shift not only to solve the secrets of the Desert Locust but also to develop innovations for their control. Great scientific discoveries were made and the essential international cooperation in the fight and prevention of locust plagues began to develop. As a result, for the first time in history it could be proven that mankind was not just a victim, but could also protect itself effectively against recurrent locust plagues.



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Locust swarms stripped areas in and around Palestine of almost all vegetation from March to October 1915. Djemal Pasha, the Supreme Commander of Syria and Arabia, launched a campaign to limit the devastation

The new century announced itself with a heavy invasion of Egypt and the Sinai Peninsula in 1904. Between July and August 1905, some swarms were observed flying from Eritrea towards Ethiopia. The Desert Locust continued to be present in Eritrea until 1912 where they completely destroyed all crops. A new plague then developed which lasted from 1912 to 1919. Locust swarms invaded Palestine and Syria in 1915. The invasion lasted eight months and wiped out entire crops and orchards. Emergency laws were called into effect, ordering "... all men ages 15 to 65 to collect 44 pounds of

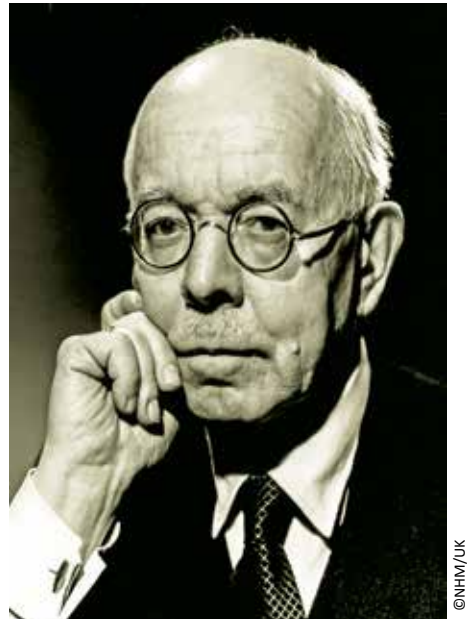


locusts and larvae.” A New York Times newspaper account stated at this time, “... as far as the eye could reach the fields were covered by the locusts, and even the street in front of the American consulate had the appearance, in the movement of the green and black mass, of a flowing river.”

In 1906, the International Institute of Agriculture (IIA) was founded in Rome on the extraordinary initiative of the American, David Lubin, supported by the King of Italy, Victor Emmanuel III. Besides various international enquiries such as general statistics, economic and social issues, the IIA gave particular attention to the research of appropriate methods in the fight against locusts. The 1912–1919 plague ultimately triggered international concern. But first attempts to organize an international coalition against the recurrent plagues of locusts failed not least because of World War I (1914–1918). A first international anti-locust conference planned for 1916 at IIA in Rome was delayed by the war until 1920 and failed to reach concrete results. The IIA continued operating until 1945 when it was replaced by FAO.

It was only after the 1926–1933 Desert Locust plague, which affected territories in Africa including British Sudan, the Near East and southwest Asia, that more substantial international attention and cooperation was prompted. The focus was geared first towards basic aspects such as identifying the Desert Locust outbreak areas, understanding its biology and ecology, and then developing and applying effective control measures. The objective was to *end locust plagues as soon and effectively as possible and to prevent them from developing in the future*. In this attempt, particularly British, French, Italian and Belgian institutions and scientists collaborated and conducted numerous field surveys, laboratory research, and cartographical studies. This cooperation laid the groundwork for contemporary locust management and the understanding of the biogeography of the Desert Locust.

In response to the plague, the British Government established a Locust Sub-Committee in April 1929, and set up a small unit within the Imperial Institute of Entomology in London. The unit was the forerunner of the Anti-Locust Research Centre (ALRC, 1945–1971) and the Russian-British entomologist, Sir Boris P. Uvarov (1889–1970) was appointed as its head. Uvarov had published his famous “Phase Theory” in 1921, explaining how and under which particular circumstances migratory swarms could develop and disappear again.



Sir Boris Petrovitch Uvarov (1889–1970)

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He postulated that the changes in behaviour, physiology, colour and shape of locusts were responses to population density that occurs within geographically restricted outbreak areas. He proposed that controlling populations within these outbreak areas might prevent plagues.

Uvarov was tasked to centralize locust information, organize research, search for outbreak areas and find techniques for destroying swarming locust populations. In collaboration with his assistant, Ms Zena Waloff, he pioneered modern locust studies and played a central role in organizing the flow of information, analysing various reports from affected countries and mapping the results. Uvarov knew it would be impossible to understand very mobile and fast moving pests such as locusts if the observations were limited to only parts of a vast area, stretching from the Atlantic Ocean to the Indian subcontinent, that contained locust populations. He therefore contacted various commissioners, army officers, missionaries and other



Locust control campaign on the Arabian Peninsula;  
B.P. Uvarov (first from left) in 1945

persons in the relevant regions and countries, and invited them to report any locust observations to his unit. He also distributed a leaflet containing relevant information on the insect, the first Desert Locust Survey [and Control] Form. As a result, no less than 7 986 reports were received by the unit up to 1945 and, on 21 September 1943, the first Desert Locust Bulletin was published. This was the basis for the future FAO Desert Locust forecasting and early warning system and the Desert Locust Information Service (DLIS). The information collected in the 1930s from various sources and institutions provided more reliable knowledge about the Desert Locust in most of its distribution area. The systematic collection and mapping of plague infestations allowed seasonal breeding areas to be identified and revealed that swarms migrated between them. The results were presented and discussed at a series of International Conferences



for Anti-Locust Research in Rome (1931), Paris (1932), London (1934), Cairo (1936) and Brussels (1938). The first conference confirmed the need for a centralized approach for information management as proposed by Uvarov. The third conference endorsed the regular collection, exchange and analysis of information at a centralised location. This information network, the International Desert Locust Information Service (IDLIS), was originally located at ALRC in London. In 1978, this centralized responsibility was transferred to FAO headquarters in Rome and managed by DLIS.



Badge used on the occasion of the fourth International Conference for Anti-Locust Research in Cairo (1936)



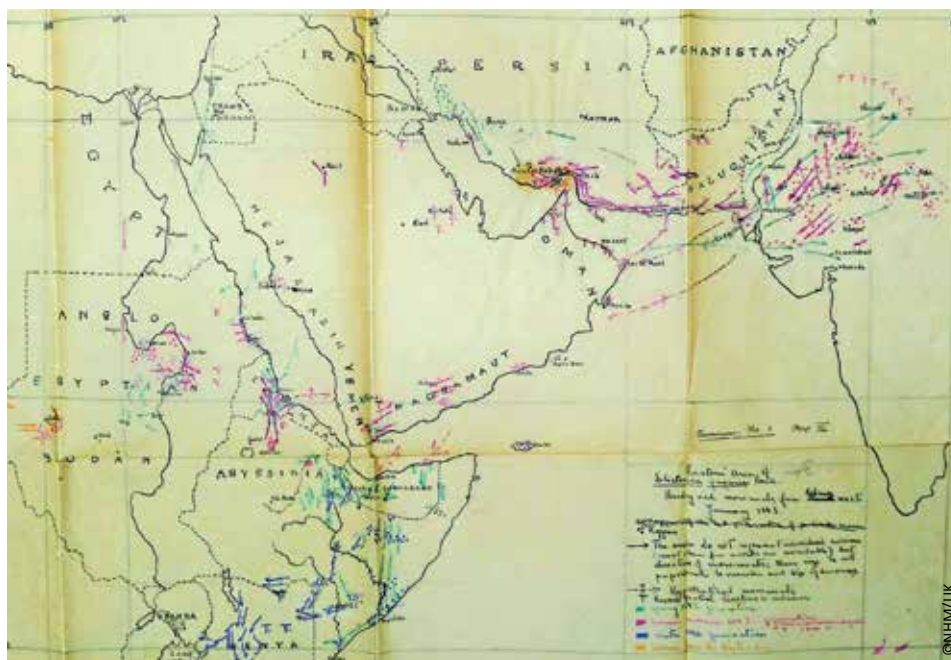
Badge used on the occasion of the fifth International Conference for Anti-Locust Research in Brussels (1938)

Following the first three conferences, researchers started to formulate ideas on preventing locust plagues by permanently supervising outbreak areas of the Desert Locust. A proposal for this was put forward at the fourth conference in Cairo. The conference recommendation sounds very similar to current ideas on preventive control.

It was noted that important outbreak areas exist around the Red Sea and recommended that concerned governments should arrange for well-trained entomologists with Desert Locust experience to periodically patrol these areas each year with a view to detecting and controlling initial outbreak populations. This proposal was presented in detail and approved in principle at the fifth and last conference in Brussels in 1938.

The resolution emphasized the need to avoid delays in controlling locust outbreaks and proposed a permanent international organization with headquarters in Port Sudan and a substation in Jeddah for the preventive control of the Desert Locust in eastern Africa and western Asia. Unfortunately, the original idea to conduct annual international conferences to provide general direction and coordination of locust research, proposed in the second conference in 1932, was interrupted by the outbreak of World War II in 1939.

As if this was not enough, another locust plague developed in 1941 that lasted for more than 20 years. The Indian locust information office first reported that locust populations were increasing substantially in 1940. Thereafter, swarms invaded Iran and arrived in the Arabian Peninsula where egg-laying took place and a first alert was issued.



A map produced by the Locust Sub-Committee in London of the Desert Locust developments and movements from February 1942 to January 1943

In summer 1941, swarms reached Egypt, Sudan and Eritrea and subsequently invaded Ethiopia and Somalia. In the face of war, this threat represented a serious danger. A famine affecting the local population would have had disastrous consequences on the Allies in their struggle to defeat the approaching armies of the enemy. In this situation, the British government established the paramilitary Middle East Anti-Locust Unit



The Egyptian delegate Abdel Meguid Mostafa el Mistikawi discussing future locust developments in Cairo (1943)

(MEALU) in 1943 with its headquarters in Cairo, but all decision-making powers remained with Uvarov and ALRC that was established in 1945 in London. In July 1943 a conference was organized in Cairo where Uvarov met the officers of the MEALU and a team of experts from India, Egypt, Syria, Lebanon, Palestine and other liberated territories including Eritrea, Cyrenaica and Tripolitania. Mr Maxwell-Darling was assigned in 1943 as Chief Locust Officer to carry out locust surveys, and the locust expert, Mr O.B. Lean, travelled from Cairo to Baghdad to set up a camp at Dhahran. At the same time, arrangements were made for a party from India under Mr D. Vesey Fitzgerald to work in Oman and eastern Saudi Arabia, and for a third mission from Egypt under the leadership of Mr Mohamed Hussein, an entomologist from the Egyptian Ministry of Agriculture, to survey Hejaz and northern Arabia. In spite of the limited resources and the many political difficulties that arose from starting the work in such a vast and unknown area, valuable information was collected to mount the 1943–1944 locust control campaign.



The MEALU Arabian Locust Team in Cairo (1944) with Mr O.B. Lean (third from right)

With the help of the Royal Air Force (RAF), two large teams with more than 800 staff, including medical personnel and radio operators, and 360 vehicles were mobilized and left Cairo to set up strategic base camps on the Arabian Peninsula to fight the incoming swarms both from India and Africa before the infestation could spread to the neighbouring countries. Poisoned bait, consisting of wheat bran mixed with 1–2 percent of sodium arsenate, was the primary control method used against mainly hopper bands.

At a later stage of the campaign, a new insecticide,  $\gamma$ -hexachlorcyclohexane (lindane), was used as dust for locust control and for the first time aerial control took place against hopper bands using a poison dust, dinitro-ortho-cresol (DNOC). The Saudi government was much concerned about the risk this posed to people and livestock



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Participants at the Middle East Locust Control Meeting in Cairo (1945) with Mr Abdel Meguid el Mistikawi (with Fes in the middle)

because locusts were much appreciated as food by nomadic tribes. In May 1945, there was even a popular uprising against the locust control campaign in Somaliland because people attributed losses of livestock to the poison [bait]” used against hopper bands.

“... The [riots] started in Burao, where in mid-May a large crowd demonstrated against the use of poison bait. The resistance then spread to Berbera, with demonstrations in which women took the leading part, stoning the senior police officer and wrecking his car.



©NHM/UK

Mixing poison bait (1952)

At the end of May, the opposition spread to Hargeisa where various groups petitioned the district commissioner, and demonstrations and rioting took place against the distribution and use of poison bait. In late May in Hargeisa, after Friday prayers, religious leaders lectured the crowd on the evils of ‘locust bait and prostitution’. The crowd rushed into a quarter of the town where a few prostitutes resided, and started looting their houses and then attacked the police with stones.”

The issues were eventually solved through good will on both sides. And although scientists and engineers took the concerns up, dusting continued to be the common practise for many years.



By 1947, the Desert Locust situation started to improve and the overall opinion about the campaign was that it had been satisfactory. The operations on the Arabian Peninsula were considered successful in spite of the harsh conditions and countless logistical difficulties; thus, damage to crops had been avoided in most regions except in Sudan and Eritrea where considerable crop losses occurred. The



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Aerial locust control with pesticide dust (1946)

control operations also proved to be difficult in Ethiopia, partly because of the rough countryside and the inaccessibility of the region around Lake Tana where locusts were believed to breed, and partly because of fear of objection from the local population. But the most important lesson from this exercise was that it had been demonstrated for the first time in history that it was possible to face a Desert Locust threat successfully, if the operations were properly planned and executed. But at what price!

During the 1949–1963 plague, new techniques to reduce the amount of poisonous pesticides such as ultra low volume (ULV) drift spraying and its associated equipment were developed, as well as spraying swarms from air to ground and air to air. ULV spraying was also advantageous because it was extremely practical for locust control. Much smaller quantities of pesticide needed to be transported and no water was required for mixing. This made it easier for the control teams than to handle poison dusts or emulsifiable concentrate (EC) pesticides. The ULV technology was thus quickly adopted and became the recommended standard locust control technique.

The introduction of the organochlorine dieldrin, a persistent and cumulative pesticide, led to the standard practice of spraying pesticide barriers on vegetation located within the likely path of marching hopper bands. The hoppers gradually accumulated a lethal dose as they crossed one or more barriers and died. However, as dieldrin was highly persistent with long-term cumulative effects on the food chain, it was eventually replaced at the end of the 1985–1989 plague by less persistent but logistically more demanding pesticides such as the organophosphates, carbamates and pyrethroids.

The discussions concerning the use of poison and the disposal of high amounts of obsolete pesticides left over from previous locust control campaigns and their adverse effects on human health and the environment have continued ever since.



©FAO

Aerial locust control by spraying ULV pesticide (2006)



©NHM/UK

The effects of aldrin used in the locust campaign of 1952 in the Near East

Towards the end and as a result of World War II, which concluded in Europe in May 1945, vast areas were in ruins and millions of people in Europe and elsewhere suffered from severe malnutrition and hunger. With the idea of preventing a looming food crisis of a global dimension and to effectively meet the challenge of increasing demand for food because of a growing world population, the President of the United States of America, Franklin D. Roosevelt, called for the creation of a permanent organization for food and agriculture at a United Nations Conference in 1943 in Hot Springs, Virginia (United States of America). As a result, FAO with its headquarters in Washington, D.C. was established on 16 October 1945. In 1951, the Organization moved to Rome, Italy.

In the effort to produce more food it was evident that increasing and intensifying crop production would also provide excellent conditions for locusts and that particular international attention to the locust problem would be needed.

The issue of development and use of environmentally less harmful control techniques remains high on the agenda of the affected countries and international organizations to this day. This constant attention has led to the development and introduction of very specific control agents with less harmful effects than chemical pesticides on the environment, for instance insect growth regulators and biopesticides such as the entomopathogenic fungus *Metarhizium anisopliae* var. *acridum*.



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Locust control campaign in Eritrea during 1945:

*"All drivers are requested to report to the CAD or police any bands of locust hoppers encountered on the road. Please give size of bands and numbers to the nearest post."*

## 1.5 The birth of CRC (1950–1967)

**T**he next Desert Locust plague (1949–1963) announced itself already in October 1948 when a cyclone moved across southeastern Arabia and rain fell from Salalah to the Trucial Coast. The area could not be surveyed and the first of several opportunities to prevent an upsurge was missed. Uncontrolled breeding occurred in Yemen in spring and summer 1949 and led to large-scale breeding in the interior of the Arabian Peninsula and on the Somali coast in spring 1950. Swarms produced from this breeding invaded the African summer breeding areas in the Central and Western Regions.

Heavy breeding took place in Sudan and extended into Chad while moderate breeding occurred in Eritrea and Ethiopia. By September, numerous swarms had formed and started to migrate towards the north and northwest and invaded a large area from Morocco to Libya. Swarms also moved from Sudan through Egypt and eastwards into the Red Sea Trench and Arabia. Winter breeding in Somalia and around the Red Sea gave rise to additional swarms. The plague had started.



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Participants at the Desert Locust Survey (DLS) Committee Meeting in 1952.  
In the middle left to right: Sir B.P. Uvarov, Mr O.B. Lean and Mr Maxwell-Darling

Given the deteriorating situation and realizing the need for stronger international coordination of locust control efforts, FAO called for an international conference on locust control in October 1951. Delegates at the conference recognized that FAO was the best placed international agency to coordinate locust control campaigns. One month later, the sixth session of the FAO Conference agreed to establish a Technical Advisory Committee (TAC) on Desert Locust Control to guide FAO on control matters. Committee members included Egypt, France, India, Pakistan, the United



Kingdom and the United States of America. Mr B.P. Uvarov acted as FAO consultant to the committee and the previous MEALU locust officer, Mr O.B. Lean<sup>[1]</sup>, Chief of the FAO Locust Control Office until 1963, provided the secretariat. The FAO TAC met once or twice each year until 1967 to assess the locust situation and was mainly focussed on control operations in the Arabian Peninsula and on suppressing the 1949–1963 plague.

At the first TAC meeting in March 1952, FAO announced it had secured technical assistance funds for purchasing trucks, aircraft and insecticides for member countries that were affected by the plague. This kind of international cooperation has regularly played a decisive role ever since in reducing crop losses caused by Desert Locust.



“The impossible attempt”. Locust control in Ethiopia (1958)

The second TAC meeting reviewed the situation in November 1952 and identified the areas of immediate strategic importance such as British and Italian Somaliland, Ethiopia and British East Africa as well as parts of the Arabian Peninsula. The objective was to prevent further spread of locust swarms and avoid crop losses. The committee also recommended that FAO, as coordinating agency, “... *should take active steps to stimulate governments ... to encourage and support locust control within their territories, with the hope that these countries may themselves be able to participate directly in a regional programme.*” In September 1954, FAO convened a working group to prepare the workplan for the 1954–1955 locust control campaign in the Arabian Peninsula. The working group also examined the status of the various FAO Desert Locust control

[1] O.B. Lean was a Desert Locust control specialist of the FAO Plant Production Branch of the Agriculture Division from 1955 to 1961, and was Chief Locust Officer from 1962 to 1963. He spearheaded important long-ranging organizational changes at FAO such as the establishment of the Desert Locust Control Committee (DLCC) in 1955, which integrated previous subcommittees for coordinating locust control campaigns on the Arabian Peninsula and in East Africa. In 1962, Lean initiated the establishment of the FAO Regional Commission for the Eastern Region, the forerunner of SWAC, and of DLCO-EA, which replaced the previous FAO East African Desert Locust Control Sub-Committee.

committees and recommended that the previous Coordinating Committee for the Control of the Desert Locust in the Arabian Peninsula should be expanded into an overall FAO Desert Locust Control Committee (DLCC) including all the other regions. In accordance with the recommendations, the Director-General of FAO established the DLCC in January 1955 with the mandate: *to keep the Desert Locust situation under review, to coordinate the locust control campaigns in the Arabian Peninsula and elsewhere, and to promote the coordination of national and international policies for preventive control.*

The first DLCC session was convened at FAO headquarters in Rome in April 1955. The



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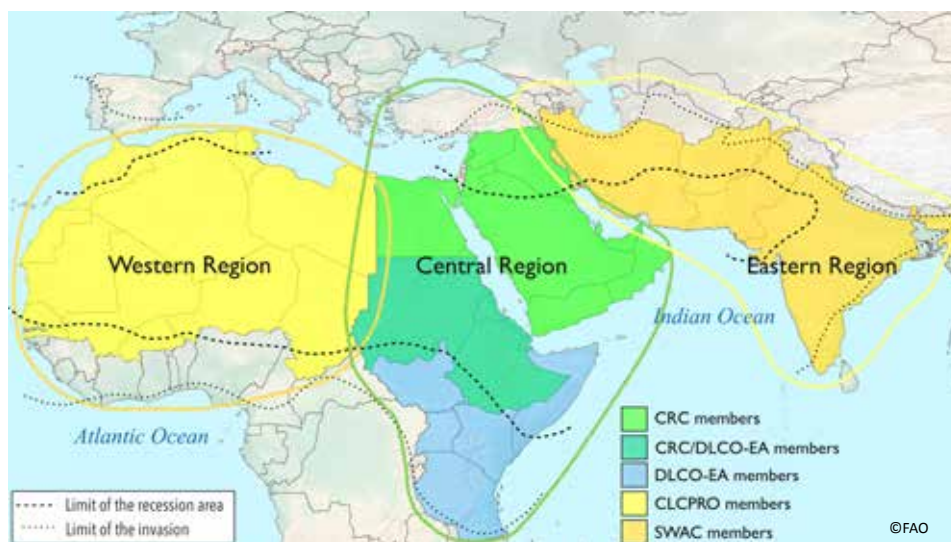
A Desert Locust swarm crossing the airport of Hargeisa, northern Somalia (1960)

session examined the Desert Locust situation and the progress of the control campaign in Arabia. It also reviewed international financial resources and the planning for the 1955–1956 campaign in the Arabian Peninsula. It was noted that the FAO International Desert Locust Control Centre (IDLCC) in Jeddah, established in 1954, had been manned by one senior locust officer, three locust officers and one administrative officer. With the aim of delegating *as much responsibility to those directly involved in the locust control operations in the Arabian Peninsula*, the session agreed to establish an Executive Committee for Desert Locust Control in the Arabian Peninsula under the DLCC. This committee was tasked with preparing control plans and ensuring effective collaboration between governments. This may have been the nucleus of the future CRC. In 1957, the fourth DLCC session modified the title of the committee to the FAO Arabian Peninsula Desert Locust Control Sub-Committee.

Since the beginning of its work in 1952 on fighting the locust plague, FAO had concentrated almost entirely on curative control, providing material assistance to national locust services for responding to emergency situations, and coordinating international efforts specifically in the Arabian Peninsula and East Africa. But there

was increasing concern that the current reactive response strategy was not proving to be fully effective. Better cooperation and coordination efforts among affected countries were needed and solutions were required that considered the problem throughout the locust area as a whole.

With this in mind, the seventh TAC session in 1957 recommended that the locust distribution area be divided into regions. Furthermore, regional organizations should be set up to coordinate all control activities within each region and to report to the DLCC. An “*Eastern Group*” comprising India, Pakistan, Afghanistan and Iran, was established that later became the FAO Commission for Controlling the Desert Locust in South-West Asia (SWAC).



The three Desert Locust regions and their organizations

An “*Eastern Africa Group*” was recognised that later became the Desert Locust Control Organization for Eastern Africa (DLCO-EA). A “*Western African Group*” was identified, comprising countries in West and Northwest Africa, which eventually evolved into today’s FAO Commission for Controlling the Desert Locust in the Western Region (CLCPRO). Finally, the committee recommended the expansion of the existing FAO International Locust Control Centre based in Jeddah and the creation of a “*Near East Organization*” comprising Turkey, Iraq, Lebanon, Syria, Jordan, Egypt and Sudan in addition to the countries of the Arabian Peninsula.

The first concrete step towards the creation of an FAO Desert Locust commission in the Central Region had been taken, but another ten years would be required before the Commission was actually established. For example, delegates at the fourth FAO Regional Conference for the Near East in 1958 made a proposal for an “expanded inter-regional project on Desert Locust control”. In October 1958, the 29<sup>th</sup> FAO Council noted: “Attention was called to the need for steering FAO work [on the Desert Locust] by international experts ... and to convene an expert panel ... to devise plans

for the best overall utilization of national and international resources ...” In short, the international community called for a long-term policy and a more proactive approach to prevent future Desert Locust plagues. In view of these requests, FAO convened an expert panel in Rome from 27 April to 1 May 1959 to “advise the Director-General of FAO on the most appropriate and effective manner in which FAO might apply its resources, and to recommend how best national locust control organizations might apply their services for controlling Desert Locust plagues to the greatest common benefit throughout this locust’s invasion areas.”

The panel members analysed the situation and the practical difficulties of locust control approaches at the national, regional and international levels and concluded that they “... could not recommend a scheme for preventive control, as Desert Locust plague dynamics were still insufficiently known”! They agreed, however, that it was no longer plausible to assume that Desert Locust plagues would arise in a few permanent outbreak areas. They therefore called for a more flexible and proactive approach based on an effective locust reporting system in each of the countries and well-coordinated research for developing long-term preventive control strategies. In addition, the Panel recommended contingency plans for rapidly reinforcing the capacities of recession control units during emergencies, with additional national or international support. The forward-looking findings of the Panel had important organizational and structural consequences. As one of the first results, the United Nations Special Fund (UNSF), later the United Nations Development Programme (UNDP), funded the large-scale Desert Locust Project (SF/INT-REG1) from 1960 to 1970, which provided important baseline data for future locust control concepts and approaches.



The first meeting of the Standing Group of Experts under the UNSF Desert Locust Project in London, 1963. In the middle, the project manager Mr Hans J. Brédo



The UNSF Desert Locust Project became operational in June 1960. The overall responsibility for the implementation of the Project on behalf of UNDP remained with FAO as executing agency and with Mr H.J. Brédo as project manager. The FAO TAC served as the expert advisory body for the implementation of the project.

*The overall purpose of the project was to develop more effective and less expensive control strategies in order to relieve the affected countries of the economic burden of the cost of control operations and the extent of crop damage.*

*The aim was to develop through national and international cooperation a long-term policy of Desert Locust control, whereby recurrent locust plagues could be prevented by applying a regional strategy using the most advanced techniques.*

Eventually, a total of 42 countries of the locust belt in Asia, Africa and the Near East participated in the project. Thus, the scope of the project was extremely wide both in its geographical dimension and the nature of its work. Each participating government designated a liaison officer for the project to allow smooth coordination of the various activities.

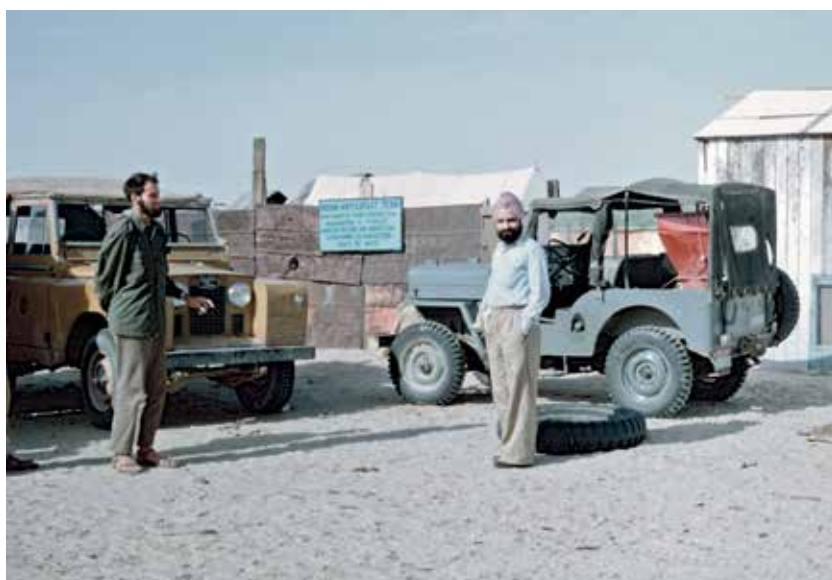


Desert Locust ecological survey in Wadi Dawasir, Saudi Arabia led by Mr G. Popov (1962)

The UNSF Desert Locust Project undertook intense operational research and training. It carried out extensive ecological surveys and helped to resolve the controversy related to the factors that initiate plagues. The project demonstrated that plagues did not arise solely from swarms present during recessions but that gregarization followed the buildup of non-swarming populations over several generations. Locust reporting and early warning systems were enhanced by integrating meteorological data and new technologies. A regular information exchange network through radio contacts between

countries was established. Based on an agreement reached between FAO and ALRC in 1958 to establish an International Desert Locust Information Service (IDLIS) as part of ALRC, FAO sponsored the preparation of monthly locust situation summaries, forecasts and warnings. In 1960, IDLIS was renamed as Desert Locust Information Service (DLIS). In 1961, DLIS became an integral part of the UNSF Desert Locust Project and was eventually absorbed into FAO in 1978 to ensure continuation of forecasting services for the benefit of the affected countries up to now.

In 1962, the seventh DLCC session brought the establishment of regional organizations back on the agenda and recommended to convene a meeting of the countries in the Near East and other countries concerned to consider the establishment of a permanent Near East regional organization, as had been suggested in the seventh TAC session in 1957.



Members of the Indian team during the Desert Locust ecological survey in Saudi Arabia (1962)

By 1963, the overall locust situation had improved significantly. As a consequence, many countries and organizations became reluctant to give their support and ceased to participate in locust control operations in the Arabian Peninsula. But the danger of another resurgence of the locust plague persisted. Thus, the eighth DLCC session in 1963 reaffirmed the recommendation made in its seventh session and urged FAO to convene as soon as possible a meeting with the Near East and other interested countries and organizations to consider the establishment of a permanent Near East regional organization.

In the pursuance of the repeated recommendation, the FAO Regional Locust Officer, Mr M.F. Leheta, based in Jeddah, conducted a preparatory visit to most countries to obtain their views on the establishment of the proposed regional commission in the Near East.



At the 23<sup>rd</sup> session of the FAO Arabian Peninsula Desert Locust Control Sub-Committee in Amman, Jordan, a preliminary meeting on the subject was held in July 1964. The session convened a Special Meeting in Beirut, Lebanon, in March 1965 to consider a draft agreement for establishing a Near East locust commission. The meeting decided that a “*Regional Commission for Controlling the Desert Locust in the Near East*” should be established within the framework of FAO under Article XIV of its Constitution. The Establishment Agreement was submitted to the 44<sup>th</sup> session of the FAO Council held in June 1965 and approved by FAO’s member countries without amendment. It was sent to the concerned governments for acceptance and the governments of Jordan, Kuwait, Lebanon, Qatar, Sudan, Syria and Egypt (United Arab Republic) became the first members of the Commission.



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FAO Regional Locust  
Officer, Mr M.F. Leheta



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The premises of the Locust Research Station in Jeddah, Saudi Arabia (1976)

Thus, the Near East Locust Commission was born on 21 February 1967. The 11<sup>th</sup> DLCC session decided to suspend the FAO Arabian Peninsula Desert Locust Sub-Committee once the Commission became operational.

As per the Establishment Agreement, the Commission’s role was defined as the *promotion of national, regional and international cooperation and coordination within the region*. It was expected that the Commission would pay particular attention to *capacity development related to Desert Locust survey and control*, and to *assist the national programmes with supplies as required*. The Commission was also tasked with *encouraging joint activities at regional and interregional levels* and to *foster cooperation and exchange of experience*. At the heart of the Commission’s efforts was, and still is, *to ensure regular locust surveys and the dissemination of locust reports*.

AGREEMENT FOR THE ESTABLISHMENT OF A COMMISSION FOR  
CONTROLLING THE DESERT LOCUST IN THE NEAR EAST

Preamble

The Contracting Governments, having regard to the urgent necessity of preventing losses to agriculture in certain countries in the Near East caused by the desert locust, hereby establish within the framework of the Food and Agriculture Organization of the United Nations (hereinafter referred to as "the Organization") a Commission to be known as the "Commission for Controlling the Desert Locust in the Near East", whose object shall be to promote national and international research and action with respect to the control of the desert locust in the Near East. The Near East (hereinafter referred to as "the Region") is defined, for the purposes of this Agreement, as consisting of the territories of Iraq, Jordan, Kuwait, Lebanon, Saudi Arabia, Sudan, Syrian Arab Republic, Turkey, United Arab Republic, Yemen and of other territories in the Arabian Peninsula situated South of latitude 27 degrees North.

Article I

Membership

1. The Members of the Commission for Controlling the Desert Locust in the Near East (hereinafter referred to as "the Commission") shall be such Member Nations and Associate Members of the Organization situated in the Region defined in the Preamble as accept this Agreement in accordance with the provisions of Article XIV of this Agreement.
2. The Commission may, by a two-thirds majority of its membership, admit to membership such other Nations situated in the Region that are Members of the United Nations as have submitted an application for membership of the Commission and a declaration made in a formal instrument that they accept this Agreement as in force at the time of admission.

Article II

Obligations of Members regarding National Policies  
and International Co-operation for the Control of the  
Desert Locust

1. Members undertake to maintain through the Secretary of the Commission a regular exchange of information on the current locust situation and the progress of control campaigns within their countries and also to transmit such information regularly to the Desert Locust Information Service in London.
2. Members undertake to carry out all possible measures to control plagues of the Desert Locust within their countries and to reduce crop damage by adopting the following procedures:

## 1.6 The CRC (1967–2017)

In 1967, FAO designated the Regional Locust Officer, Mr M.F. Leheta, funded by UNDP, as responsible for the new Near East Desert Locust Commission. The member countries of the Commission met 29 times between 1967 and 2016. From the original seven member countries, the membership of the Commission more than doubled in 50 years to 16, and CRC became the largest of the three FAO Desert Locust regional commissions.



The CRC region in 2017

### The first session (1969)

The first regional Desert Locust commission, SWAC, was established in 1964. The second commission, officially referred to as the “*Commission for Controlling the Desert Locust in the Near East*” held its first session in Baghdad, Iraq on 1–4 February 1969. Delegates of the seven member countries (Egypt, Jordan, Kuwait, Lebanon, Qatar, Sudan and Syria)<sup>[2]</sup> attended the session. Representatives from Bahrain, Iraq, the People’s Republic of Southern Yemen, Saudi Arabia, Turkey, the Yemen Arab Republic, DLCO-EA and the United Kingdom were invited as observers.

The meeting urged the governments of Bahrain, Iraq, Saudi Arabia, Southern Yemen and the Yemen Arab Republic to join the Commission as soon as possible. The session approved an annual budget of USD 139 540 and requested the Director-General of

<sup>[2]</sup> Up until about the 1990s, Egypt was often referred in the sessions as the United Arab Republic, Kuwait as Kuwait State, Oman as the Sultanate of Oman, Saudi Arabia as the Kingdom of Saudi Arabia and Syria as the Syrian Arab Republic. For our purposes, Egypt, Kuwait, Oman, Saudi Arabia and Syria are used.

FAO to establish a Trust Fund into which the member countries would pay their annual contributions by 1 July of each year. The major contributors to the Trust Fund were Iraq, Sudan and Egypt. In view of the strategic importance of Saudi Arabia in fighting the locusts, the session agreed that Jeddah would be the most appropriate place for the seat of the Commission.

The session also established an Executive Committee with responsibility to coordinate field research in the region. As for the date and place of the next meeting, the Commission recommended that this should be determined by the Director-General of FAO.



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The 13<sup>th</sup> DLCC session was held in 1969 in Rome, chaired by Mr Mas'Ud Taji El-Faruki (Saudi Arabia), assisted by the Committee Secretariat Mr Gurdas Singh (FAO)

### **The second session (1971)**

The Director-General of FAO convened the second session on 26–29 April 1971, and following Lebanon's offer to host it, the venue was Beirut. The new Regional Locust Officer, Mr Ahmed Khasawneh, replaced Mr M.F. Leheta in July 1969. The delegates of the now ten member countries (Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, People's Democratic Republic (PDR) of Yemen, Qatar, Sudan and Syria) participated in the meeting, while representatives from Saudi Arabia and the League of Arab States attended as observers.

The meeting acknowledged that despite the relatively calm locust situation, governments should maintain locust surveys in the important areas. Appreciation was expressed for the support received by some of the countries from the UNDP/SF Desert Locust Project for radio communications and survey equipment. The Executive Committee reported on field research in the region. For unknown reasons, the Secretariat could



neither present an account for the 1970 expenditures nor a programme of work and budget for the next year. Furthermore, the session proposed to consider Rome, Italy as the appropriate seat for the Commission.

### **The third session (1972)**

The third session was held in Amman, Jordan from 29 July to 1 August 1972. Only five Member Governments were present, but Saudi Arabia and Oman attended as observers. The meeting reviewed the locust situation and noticed only a few locust activities except for Oman where significant locust populations were developing. Because no arrangements for locust survey and control existed in Oman, the potentially dangerous situation prompted immediate emergency assistance in terms of vehicles, exhaust nozzle sprayers, dusters and pesticides provided by FAO and Saudi Arabia. FAO sent a locust officer to assess the situation for one month and a Pakistani team in Sharjah was placed on standby to assist with control operations. In addition to routine surveys, extensive surveys had been carried out in 1971–1972 throughout Saudi Arabia in collaboration with the FAO International Desert Locust Control Centre in Jeddah to investigate ecological conditions in the breeding areas.



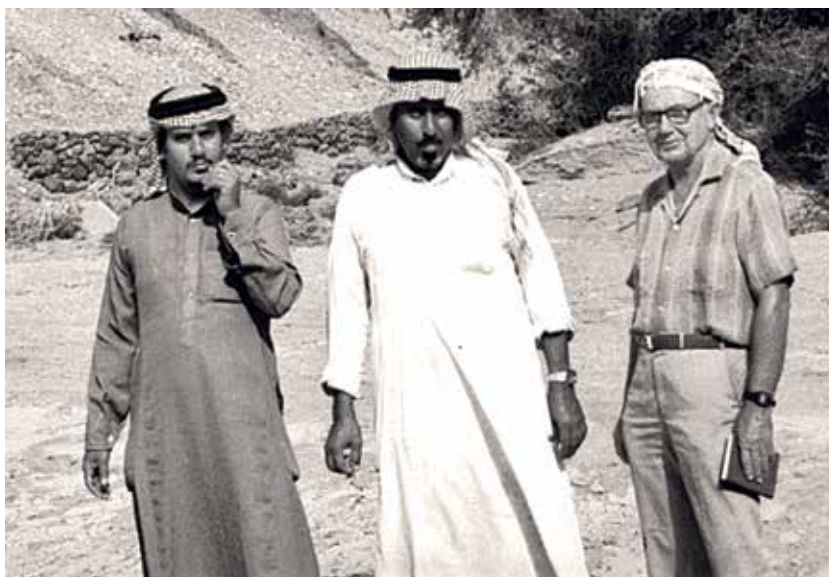
A survey team monitoring ecological conditions in Saudi Arabia (1962)

The programme of work and budget for the period was discussed. It was decided that the overall programme should be planned for a five-year period until 1977, starting from January 1973, with the provision that budgets should be reviewed in the annual sessions. The meeting agreed to provide basic assistance to PDR Yemen in order to secure normal operations and to Oman for establishing a national locust control service. Oman and Saudi Arabia informed the session that they wished to become members of the Commission. No further reference was made to the proposal of the second session to move the Commission's seat to Rome.

### **The fourth session (1973)**

The fourth session of the Commission was organized in Cairo, Egypt from 15–18 September 1973. Delegates from the member countries of Egypt, Bahrain, Iraq, Jordan, Kuwait, Lebanon, Oman, PDR Yemen, Qatar, Saudi Arabia and Sudan participated.

The locust situation as well as survey and control operations during 1972–1973 were reviewed. It was concluded that the extraordinarily favourable conditions in the southwest part of the Arabian Peninsula could result in a potentially dangerous situation.



A locust survey team in Saudi Arabia with Mr G. Popov (right) in 1985

The session was informed of the emergency actions undertaken on the Red Sea and Gulf of Aden coastal plains as well as the aerial operations, coordinated by Mr George Popov, carried out in Saudi Arabia by one DLCO-EA aircraft and one aircraft from Sudan. The Commission thanked DLCO-EA and Sudan for the timely assistance to control the upsurge in its initial stage.

Several recommendations on field research programmes were made, emphasising the need for exchange visits between researchers of the field research stations in the region. The programme of work and budget for 1974 was agreed. It included special surveys in areas of strategic importance such as the Tihama of Saudi Arabia and Yemen and in Oman. The surveys were to be joined by locust officers from other member countries.



## **The fifth session (1974)**

The fifth session was held in Jeddah, Saudi Arabia on 12–16 September 1974. Ten member countries (Egypt, Iraq, Jordan, Kuwait, Oman, Qatar, Saudi Arabia, Sudan, Syria, and Yemen Arab Republic) participated in the session. Though the locust situation had improved compared with 1973, the favourable ecological conditions that persisted in PDR Yemen, the Jizan area of Saudi Arabia and on the Tihama in Yemen Arab Republic required close observation and continuing vigilance. In accordance with the recommendations of the fourth session, a special survey was carried out for 4.5 months in Saudi Arabia with the assistance of two locust officers from Egypt and Jordan. The infestation discovered on the southern Tihama had been controlled by a DLCO-EA aircraft before the locusts could escape to other countries.



A DLCO-EA aircraft demonstrating a mock aerial pesticide application in Saudi Arabia (1976)

The success of the aerial interventions demonstrated that it was an essential component in locust control operations to prevent upsurges. The Commission strongly recommended that the Government of Saudi Arabia should establish an aerial unit of at least three aircraft for Desert Locust survey and control.

The Commission also appreciated the arrangements made for a special survey in Oman and reiterated the recommendation of the third session that the Government of Oman be assisted in establishing a permanent national locust control unit. With support from SWAC, Pakistan sent a survey mission to the United Arab Emirates. This helped to cover an important area that had no local locust control capacity.

## **The sixth session (1975)**

In 1975, the sixth session was held in Kuwait from 30 August to 2 September. Of the 14 member countries, nine attended (Egypt, Jordan, Kuwait, Lebanon, Oman, PDR Yemen, Qatar, Saudi Arabia and Sudan).

The meeting noted that a serious situation had developed on the northern Tihama in Saudi Arabia because of good rainfall in October and November 1974. As a result of control operations from November 1974 to March 1975 against swarms, fledglings and hopper bands, infestations had declined considerably. A locust outbreak on the coastal plains of Sudan was also brought under control in February 1975. Except for some locust activity reported from the Yemen Arab Republic, the situation in the other countries remained calm.



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Desert Locust survey on the Tihama coastal plains of Saudi Arabia (1979)

The Commission emphasized once again the importance of prompt and immediate exchange of information between member countries in addition to the usual communication channels through the FAO Regional Locust Secretariat in Jeddah. The session also agreed on two special surveys during 1975–1976 of strategic locust areas in Oman, which would also provide in-service training to national locust control staff. The meeting expressed an interest in participating in the FAO project on exploring remote sensing technology for detecting important rainfall events that otherwise would remain unnoticed by the sparse meteorological network in the recession area.

Because of global inflation, a revision of the member countries' annual contribution to the Commission's Trust Fund was discussed. It was proposed to increase contributions by 25 percent, raising the annual budget to USD 200 000. Great concern was expressed about the UNDP decision to discontinue financial support for the FAO Regional

Locust Officer post in Jeddah with effect from January 1976. The Commission requested the Director-General of FAO to establish the post within FAO's regular programme budget as recommended by the 17<sup>th</sup> session of the FAO Conference.

### **The seventh session (1976)**

Despite the invitation of Sudan, the seventh session of the Commission could not be organized in Khartoum, so it was held at FAO in Rome on 18–22 October 1976 instead. Delegates from Egypt, Jordan, Kuwait, Oman, Qatar, Saudi Arabia, Sudan and the United Arab Emirates participated.



Participants at an UNDP/FAO international radio operators training course in Cairo (1976)

The session noted the relatively low locust activity in the region. Control operations were carried out in Saudi Arabia, PDR Yemen and the Yemen Arab Republic with the assistance of one DLCO-EA aircraft. Two planned special surveys had been conducted in Oman, assisted by a locust expert from Egypt who also provided training on survey and control to ten Omani plant protection officers. Based on this successful experience, another training course for field officers from Oman, Qatar and the United Arab Emirates was planned. The Commission appreciated the support Saudi Arabia provided to the Yemen Arab Republic in terms of vehicles, dusters, sprayers, insecticides and cash.

Expenditures incurred during the period 1973–1977 were reviewed and a budget for the next five-year period of 1978–1982 was approved. This also included the new scale of contributions. The meeting noted that unpaid arrears to the Trust Fund had already reached USD 298 888 and exceeded the proposed annual budget of USD 200 000. The session also amended the text of the Establishment Agreement of the Commission concerning membership, observers and procedural rules.

### **The eighth session (1977)**

The eighth session took place in Doha, Qatar on 10–13 December 1977. Eleven out of 14 member countries attended (Egypt, Bahrain, Iraq, Jordan, Kuwait, Oman, Qatar, Saudi Arabia, Sudan, United Arab Emirates and PDR Yemen). The locust situation remained relatively calm, but Somalia and Ethiopia received exceptionally heavy rains in October and November. The movement of locust populations from this area into southwestern Arabia and the coastal plains of Sudan was considered likely.

The assistance provided by Iraq to the United Arab Emirates in terms of spray aircraft and insecticides was highly appreciated by the meeting. The planned training course in locust survey and control was carried out in Muscat, Oman for trainees from the Gulf States.



A Desert Locust swarm in Ethiopia (1976)

### **The ninth session (1978)**

The ninth session was held in Baghdad, Iraq from 16–19 December 1978, attended by Egypt, Iraq, Jordan, Kuwait, Oman, PDR Yemen, Qatar, Saudi Arabia, Sudan, Syria, United Arab Emirates and Yemen Arab Republic. A detailed account was provided by delegates of the locust developments and the control operations carried out in Saudi Arabia, Yemen Arab Republic, PDR Yemen and Sudan. Serious developments were noted in several areas. All national units were requested immediately to make every endeavour to locate and survey areas of rainfall in order to detect and control any breeding populations.

Special surveys were again carried out during 1978 in Oman and the United Arab Emirates with assistance from Pakistan and the Yemen Arab Republic. In addition, the session emphasized the importance of continuing regular surveys in winter breeding areas along both sides of the Red Sea and Gulf of Aden.



A survey vehicle stuck in a riverbed in Ethiopia

### **The tenth session (1979)**

Instead of the planned venue of Abu Dhabi, United Arab Emirates, the tenth session of the Commission took place again in Rome on 5–7 December 1979 with delegates from Egypt, Iraq, Jordan, Kuwait, Oman, Qatar, Saudi Arabia and PDR Yemen. In view of the prevailing recession in the region after the 1977–1978 upsurge, the meeting was mainly concerned with maintaining survey activities and using the standardized guidelines and reporting forms distributed by FAO headquarters. A consolidated statement of accounts for 1978 and the programme of work and budget for 1980 were approved.

The critical need to continue locust research work in the region was recognised especially given the expected termination of the UNDP assistance in December 1980. As the project provided important support for survey and control operations in the Yemen Arab Republic and PDR Yemen, the Commission requested an extension of the project because it feared that any reduction of these activities would seriously affect neighbouring countries and other regions.

### **The 11<sup>th</sup> session (1980)**

Only five of the 14 member countries (Egypt, Iraq, Jordan, Kuwait and Yemen Arab Republic) attended the 11<sup>th</sup> session in Amman, Jordan on 13–16 October 1980. The meeting noted that the locust situation throughout the region remained calm and



required only a few limited interventions in Egypt, Saudi Arabia and Sudan. The Commission urged member countries to remain vigilant in order to keep the recession going. Another special survey was carried out in the United Arab Emirates with the assistance of an Egyptian locust officer. As a result of this survey, the United Arab Emirates decided to establish a Locust Control Unit within the Plant Protection Service. The Commission agreed to appoint an officer, at the expense of the Commission Trust Fund, for one year. Realizing the importance of the Red Sea coastal area bordering Egypt and Sudan, the meeting recommended that joint Egyptian-Sudanese teams should conduct surveys there and requested FAO to coordinate these activities.

The 25 percent increase in annual contributions by member countries proposed at the sixth session was approved and the Secretariat was requested to approach the governments in order to implement this decision with effect from 1981.



Trying to get a loaded truck out of the mud

### **The 12<sup>th</sup> session (1981)**

The 12<sup>th</sup> session was again hosted by FAO in Rome on 7–11 September 1981 and focussed on research and staff capacity-building issues. Delegates from Egypt, Iraq, Jordan, Kuwait, PDR Yemen, Saudi Arabia, Sudan and Yemen Arab Republic noted that control operations were carried out only in Saudi Arabia and Sudan, treating hopper bands and swarms covering 134 000 ha.

Given the importance of breeding areas on the Red Sea coast, the Commission reiterated the need to continue surveys on both sides of the Red Sea and to inform all national, regional and international parties of the results. As Egypt and Sudan had undertaken the first joint ground and aerial surveys on their borders, the meeting felt

that special surveys might no longer be required. Survey capacities in the member countries were now sufficient to maintain surveys at each nation's expense without support from the Commission.

Other progress made included the approved establishment of an FAO locust expert post by the United Arab Emirates, and the first regional training course on locust control and radio communication organized in Sana'a for 18 days for countries of the Arabian Peninsula. Only two trainees from two countries participated in addition to 13 trainees from the host country.

The meeting also took note of the various short-term training courses and of fellowships for national locust officers sponsored by the Commission and FAO, and organized in India, Sudan and the United Kingdom. A request was made to FAO to increase training opportunities because of the lack of qualified personnel in the region. Research programmes had been carried out on the ecological factors affecting Desert Locust morphometrics, on locust nematode parasites and on testing ULV spraying equipment for aerial application. Various insecticides such as fenitrothion, DDT, lindane and dieldrin had been studied as well as the effects of hormones on Desert Locust. The few research results in the other Commissions were discussed and it was recommended to strengthen interregional research exchange and cooperation.

The proposal to establish an aerial unit in the region to serve the member countries in locust survey and control was discussed and eventually dropped. It was considered uneconomic and there were already sufficient agricultural aircraft available, including private operators if needed. The session also discussed the issue of other locust and grasshopper species that might affect crop production. But it was felt that their control should remain the responsibility of the national programmes. And it was mutually agreed that the Commission must focus on the Desert Locust and maintain the capacity to deal with it.

Several Member Governments had approved the proposed increases in contributions and the session noted with satisfaction that most countries were paying their contributions regularly. Those countries with arrears were requested to settle their dues, which had increased to USD 345 309, as quickly as possible.

### **The 13<sup>th</sup> session (1983)**

The 13<sup>th</sup> session met on 16–18 May 1983, again at FAO headquarters in Rome. The session reviewed the Desert Locust situation, which was calm in most countries except for some increased activity in the Tokar Delta of Sudan and in northern Ethiopia. It was recommended that special surveys be undertaken in strategic areas of Oman and regional and local training courses on locust control techniques as well as short-term courses and fellowships be organized. The financial position and programme of work and budget were reviewed.

## **The 14<sup>th</sup> session (1986)**

The 14<sup>th</sup> session was supposed to be held in Rome in July 1984 but a quorum was not reached; instead, the 13<sup>th</sup> session of the Executive Committee met to review the locust situation, training, finances and workplan of the Commission. Egypt offered to host the 14<sup>th</sup> session of the Commission in June–July 1985 but this did not materialize and the session was subsequently held on 3–5 September 1986 in Rome. Again, a quorum was not reached, but the 14<sup>th</sup> session of the Executive Committee was able to meet and reviewed the locust situation, control potential, training and research activities, assistance and programme of work and budget in the region. It noted that several countries did not have sufficient control resources. Consequently, the report of the Executive Committee was considered as official for this session.

There were no reports of gregarious Desert Locust populations prior to 1985 anywhere throughout the locust recession area. Locust populations quickly picked up again in October 1985 in the Senegal River valley and in Ethiopia where ground control operations were conducted in two areas of the Red Sea coast in August and September 1985.



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Gregarious locust hoppers attacking millet crops

Gregarious breeding was observed on the central Red Sea coast of Saudi Arabia in December and swarms were reported there as well as in Egypt, Sudan and Yemen Arab Republic in February 1986. Many locust swarms invaded Saudi Arabia and Egypt in 1986, Yemen Arab Republic in 1987 and Sudan and Saudi Arabia in 1988. Ground and aerial control operations were mounted in all of the affected countries. Frequent and successful locust breeding in the Central and Western Regions caused a major locust plague to develop in late 1987 and early 1988 that exceeded the coping capacities of nearly all of the affected countries. Substantial assistance was provided, especially to Sudan, to face the emergency in the Central Region.

## **The 15<sup>th</sup> session (1988)**

The 15<sup>th</sup> session was held on 20–22 June 1988 at FAO headquarters in Rome. The ten delegates regretted the decision to close the FAO International Desert Locust Control Centre in Jeddah at this critical time. But fortunately, the Locust Regional Officer post in Jeddah remained in FAO's programme of work and budget for 1990–1991.



Crops destroyed by Desert Locusts in Ethiopia

The session noted that a first national training course on radio operation and maintenance was conducted in Khartoum. A regional course on locust survey and radio communication was held in Khartoum and Port Sudan in April 1982 for participants from Egypt, Iraq, Jordan, Lebanon, PDR Yemen, Saudi Arabia, Sudan, United Arab Emirates and Yemen Arab Republic. On aerial pesticide applications, trainees from Egypt, Iraq and Syria benefitted from short-term courses organized in the United Kingdom and Switzerland.

Two trainees from Jordan and Saudi Arabia attended a remote sensing training course held at FAO headquarters. The member countries recommended giving more attention to survey, control and new technologies in national and regional training courses.

At the request of the 27<sup>th</sup> session of DLCC in June 1984 a special consultation was organized on Desert Locust plague prevention in the Central Region in 1985 and involved travel to Saudi Arabia, Yemen Arab Republic, PDR Yemen, Somalia, Kenya, Ethiopia and Sudan. The 15<sup>th</sup> CRC session concluded that plague prevention would be possible and that priority for survey and control activities should be given to the coastal areas on both sides of Red Sea and the Gulf of Aden, and to Oman. As a prerequisite, the survey and control capacities of all national units should be kept under constant review by the Commission.

The generally low participation of member countries in the sessions was regretted. And deep concern was expressed that despite all earlier appeals the total outstanding contributions to the Trust Fund had now reached USD 537 482 by 1983, more than twice the annual budget.

The reasons for the long gaps between the sessions during a very critical period for the region are difficult to understand. It is noteworthy that there was a lack of quorum in two attempts to hold the 14<sup>th</sup> session, and the session was never held. Subsequently, a major plague developed in late 1987 and early 1988. Shortly thereafter there was a sufficient number of member country delegates present at the 15<sup>th</sup> session of the Commission in mid-1988 but the session did not produce an official report in English.



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Survey team in Wadi Diib, northeast Sudan (1988). In the middle, standing: Mr Hassan Abbas, Director General of the Plant Protection Department of Sudan; second from left: Dr Philip Symmons, FAO consultant

### **The 16<sup>th</sup> session (1989)**

In 1989, the 16<sup>th</sup> session was held in Doha, Qatar from 29 October to 1 November. Delegates attended from Bahrain, Egypt, Jordan, Kuwait, PDR Yemen, Qatar, Sudan, Saudi Arabia, Syria and Yemen Arab Republic. The meeting noted that the Desert Locust plague ended in early 1989 despite favourable ecological conditions throughout the summer breeding area and locust swarms being reported from Kordofan and Darfur in Sudan. A second regional training course was conducted in Amman, Jordan in July–August 1989 for 26 trainees. Locust biology and behaviour, survey principles and reporting, safe handling and storage of pesticides, and ULV pesticide application were covered. For unknown reasons, the session only produced its official report in Arabic.



### **The 17<sup>th</sup> (1990), 18<sup>th</sup> (1992) and 19<sup>th</sup> sessions (1993)**

The 17<sup>th</sup> (1990), 18<sup>th</sup> (1992) and 19<sup>th</sup> (1993) sessions were all held in Cairo, Egypt, in a situation of deep crisis for the Commission, both in terms of financial and managerial constraints.

In between the 18<sup>th</sup> and 19<sup>th</sup> sessions, a locust upsurge developed along both sides of the Red Sea during the winter of 1992–1993 that subsequently spread to West Africa and southwest Asia. At the 17<sup>th</sup> session, delegates were informed of the proposed transfer of the seat of the Commission from Jeddah to Cairo and its integration into the FAO Regional Office for the Near East because of serious financial difficulties. The session did not object to the proposal but left the decision to FAO, Egypt and Saudi Arabia.

Serious concern was expressed about the financial deficit and the arrears of some countries such that important activities including staff training could not be realized. Outstanding contributions by member countries had reached almost USD 1 million by 1990, four times the annual budget of USD 250 000.



Mr Abderrahman Hafraoui, Senior Officer of the FAO Migratory Pests Group (left);  
Mr Niek van der Graaff, Chief of the FAO Plant Protection Service (right)

After the retirement of the FAO Regional Locust Officer, Mr Ahmed Khasawneh, in 1991 and the abolition of his post, the FAO Senior Officer for Migratory Pests, Mr Abderrahman Hafraoui, temporarily assumed the functions of acting Secretary of the Commission.

Ten member countries were present at the 18<sup>th</sup> session. The unification of the Yemen Arab Republic and PDR Yemen in May 1990 had reduced Commission membership to thirteen. The Secretariat presented the measures undertaken in view of the proposed

transfer of the Commission seat from Jeddah to Cairo and the relocation of equipment and documents to the UNDP Office in Riyadh and the Research Station in Jeddah. It is thought that many of the original documents from the early days of the Commission were lost as a result of the transfer.

The delegates unanimously supported FAO's efforts to revitalise the Commission, but strongly recommended that the Secretariat be staffed in Cairo as soon as possible. A project proposal for Preventive Control in the Western Region created great interest and delegates suggested that such a project would also be important for the Central Region.

The Executive Committee routinely presented the results of various research activities and the programme of work and budget for 1992–1993. The committee said that despite the financial deficit, the Commission could realize most of the planned activities by using other funding sources. The proposed budget for the biennium was approved, excluding long-term training activities, which should be financed by extrabudgetary funds. Member countries were urged to settle their outstanding contributions in order to help the Commission to fulfil its tasks.

At the 19<sup>th</sup> session, representatives from the Commission in North-West Africa participated for the first time as observers. This marked an important change in strengthening interregional cooperation. Mr Mahmoud Taher was temporarily assigned the duties of the Commission Secretariat as of January 1993 in addition to his FAO Regional Plant Protection Officer post, and the Commission's seat was established at the FAO Regional Office in Cairo.



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The new seat of the Commission at the FAO Regional Office for the Near East and North Africa in Cairo (2016)

The Secretariat presented an FAO working paper on preventive locust control with the overall objective of minimising the risk of Desert Locust upsurges and plagues in the Central Region, encompassing Djibouti, Egypt, Eritrea, Ethiopia, Oman, Saudi Arabia, Somalia, Sudan, United Arab Emirates and Yemen. The approach was strongly supported and it was recommended that the programme should consider, *inter alia*, important aspects such as administrative and technical arrangements, coordination with DLCO-EA and sustainability.



The Regional Plant Protection Officer, acting Secretary of the Commission, Mr Mahmoud Taher, (left); Mr Niek van der Graaff (right)

The session also discussed important amendments to the Establishment Agreement of the Commission. It was proposed that Djibouti, Ethiopia, Eritrea and Somalia should be considered as new members of the Commission. Contacts were made with the four countries to ascertain their interest in joining. Ethiopia was the first country to give a favourable reply.

It was reiterated that with the transfer of DLIS from London to FAO headquarters in 1978, member countries were requested to send their survey reports from then on directly to the Migratory Pest Group in Rome. The fact that no publications had been produced since the Commission began its existence in 1967 was commented on and it was recommended that this situation be rectified and should include publications also in Arabic. As a first step, it was agreed to translate and circulate the monthly FAO Desert Locust Bulletins in Arabic. The Executive Committee said that since the first Gulf War in 1992 the accounts of Iraq were frozen as of November that year and that the total arrears had reached USD 1 391 464.

## **The 20<sup>th</sup> session (1994)**

At the 20<sup>th</sup> session in Cairo, Egypt on 18–20 December 1994, the Commission reviewed FAO's programme for preventive locust control in the Central Region. This had been adopted by the 106<sup>th</sup> FAO Council in May 1994 as the “**Emergency Prevention System (EMPRES) for Transboundary Animal and Plant Pests and Diseases**” with the initial priorities assigned to the Desert Locust and rinderpest. FAO earmarked USD 1.5 million from the Regular Programme budget to kick-start the Desert Locust component of the programme.



Participants at the 20<sup>th</sup> CRC session in Cairo on 18–20 December 1994

The Commission took note of the report of the EMPRES (Desert Locust) Formulation Mission, which visited the Central Region countries in September–October 1994, and the EMPRES workshop convened by FAO in collaboration with the Commission in Cairo on 11–12 December 1994. Delegates from the Central Region countries and DLCO-EA participated in this workshop. The Commission strongly supported the EMPRES objectives, but also called upon FAO to assign the Commission a more important role in the areas of coordination, research and control.

The Executive Committee reported on the first sprayer evaluation workshop carried out in Cairo in August 1994. The workshop checked the performance of various spray equipment such as droplet spectrum and size, swath width, flow rate, ease of calibration, safety for the operators and the environment, work rate and cost. The Commission recommended organizing similar workshops at three to five-year intervals to evaluate new and improved equipment. The workshop reports should be made available in Arabic and English, and circulated to all interested parties. The Executive Committee also reported on research advances, urging member countries to submit research proposals for consideration and support. A working group on short and

long-term training requirements proposed national, regional and specialized training programmes for Training of Trainers (ToT), field staff, unit heads, national locust information officers and radio operators. It was clear that extrabudgetary funds would be required to realize such an ambitious training programme and the Secretariat was requested to prepare a draft project document for discussion in the next session.

Oman was visited in February 1994 to discuss the possibility of designating the Desert Locust Unit in Oman as a regional centre for Desert Locust research in the Near East. The Secretary and the Chairperson of the Commission visited Sudan, Jordan, Syria and Lebanon to request the settlement of arrears to the Commission Trust Fund. The visit resulted in payment of arrears by Syria and Lebanon, which improved the cash balance of the Commission significantly. The Commission agreed that future sessions of the Commission should be held every two years with a meeting of the Executive Committee in between the sessions.

### **The 21<sup>st</sup> session (1996)**

Following the approval of amendments to the Establishment Agreement by the 28<sup>th</sup> session of the FAO Conference in 1995, the Near East Commission changed its official name to “The Commission for Controlling the Desert Locust in the Central Region” (CRC) to allow also other Central Region countries access to membership. The 21<sup>st</sup> session held in Cairo, Egypt on 26–28 May 1996 went smoothly according to the usual agenda. Unbeknownst at the time, the session coincided with the initial stages of a two-year upsurge that was developing in Oman.

The Secretary had participated in various EMPRES meetings in Addis Ababa (1995), Cairo (1995) and Sana’a (1996). He conveyed the recommendations of the Commission and its interest in good coordination and cooperation with the EMPRES Programme to avoid overlap of efforts and enable the optimum use of human and financial resources. The draft project proposal “Training in Desert Locust Control in the Central Region” was presented by the Executive Committee. The project budget was put at USD 3.8 million and would require a full-time project manager.

At the third EMPRES meeting in Sana’a, the participants confirmed their general support for this project and recommended that the training activities should be implemented through joint programmes. The Commission noted with satisfaction that its financial situation had improved with regular contributions and some arrears paid. The cash balance at the end of 1995 was USD 871 060, but arrears of USD 1.3 million remained high in March 1996.

### **The 22<sup>nd</sup> session (1998)**

The 22<sup>nd</sup> session was held in Cairo on 28–30 June 1998. By late June, there were no reports of swarms from any countries in the region, indicating that the 1996–1998 upsurge had come to an end.



The delegates were pleased that CRC had become more active in the past five years in respect of publications and training activities. One regional training course had been carried out on radio operation and maintenance in April 1997, and a second one on locust survey and the use of survey equipment in April 1998. One ToT course was organized in the United Kingdom in June 1997 for locust officers from seven national units.

In relation to cooperation with the EMPRES Programme, no tangible achievements were noticed. The FAO Regional Conference in March 1998 had recommended establishing more appropriate mechanisms between the two entities in order to achieve synergy. In view of the importance of coordinating the various activities with the partner institutions, which warranted full-time attention, the Commission called upon the Director-General of FAO to re-establish the post of CRC Secretary as soon as possible.

### **The 23<sup>rd</sup> session (2002)**

After a break of four years caused by the transfer in 2000 of the acting Secretary of the Commission and Regional Plant Protection Officer, Mr Mahmoud Taher, the 23<sup>rd</sup> session was organized by the new CRC Secretary, Mr Munir Butrous.

For the first time since 1989, the session was held again outside of Cairo on 9–14 March 2002 and the chosen venue was Damascus, Syria. It was also the first time that the Coordinator of the EMPRES Programme in the Central Region participated in a CRC session. The delegates commended the efforts and advances made by the EMPRES/CR Programme to improve collaboration between the two entities and with DLCO-EA. This had been sanctioned by a Memorandum of Understanding (MoU) between CRC and DLCO-EA. The Commission highly appreciated the support given by EMPRES/CR to research, training, contingency planning, cross-border surveys and the introduction of the RAMSES (**R**econnaisance **A**nd **M**anagement **S**ystem of the **E**nvironment of **S**chistocerca) geographic information system for managing locust and environmental data.



The Secretary of the Commission, Mr Munir Butrous from August 2001 to April 2011

The Secretariat was requested to prepare a concept for a glossary in English, French and Arabic of technical and academic terms and expressions used in Desert Locust work. The Commission was reminded of the proposal of the FAO Council to include Ethiopia, Eritrea and Djibouti in CRC. Djibouti had sent its consent to join and was welcomed as 14<sup>th</sup> member of the Commission. The delegates from Ethiopia and Eritrea, who attended the meeting as observers, informed the Commission that an official decision was still pending.

## **The 24<sup>th</sup> session (2004)**

At the 24<sup>th</sup> session held in Jeddah, Saudi Arabia on 17–22 April 2004, the delegates welcomed Ethiopia as the 15<sup>th</sup> member of the Commission. A generally good performance in all aspects of the Commission's work was noted.

In collaboration with EMPRES/CR, a second sprayer testing workshop had been carried out in Cairo in September 2002 to evaluate new pesticide application equipment. In 2003, twelve students from Egypt, Eritrea, Ethiopia, Sudan and Yemen graduated from the Desert Locust Management Diploma course at the University of Khartoum. Numerous research projects were sponsored on alternative control options, environmental factors and non-target effects of locust control in Egypt, Ethiopia, Saudi Arabia and Sudan.

The session recognised that the Desert Locust situation in the Central and Western Regions was seriously deteriorating. As a result of good rainfall in the summer breeding areas in late 2003, a major upsurge was developing in early 2004. Given the potentially dangerous situation, the EMPRES/CR Coordinator and the CRC Secretary immediately called an ad hoc emergency prevention meeting with Eritrea, Saudi Arabia, Sudan and Yemen that was held in Khartoum in March 2004.

Surveys and control operations were quickly initiated and national and bilateral resources, notably from Saudi Arabia, were made available. In view of the looming emergency, the DLCC convened an extraordinary session in Rome from 29 November to 2 December 2004. Early warning, information exchange, survey operations and contingency planning were all activated by the national units and national emergency steering committees were established.

The session endorsed the recommendation of the Executive Committee to cancel 50 percent of the contribution arrears of Lebanon and Sudan on condition that these governments would pay their annual contributions in a timely manner and provide a schedule for the payment of their remaining arrears. By 2004, the outstanding arrears had reached USD 1.7 million.

## **The 25<sup>th</sup> session (2006)**

At the 25<sup>th</sup> session in Doha, Qatar from 28 May to 1 June 2006, Eritrea was welcomed as the 16<sup>th</sup> member of the Commission. By the time the meeting was held, the locust situation had improved considerably thanks to good coordination of control activities between the countries and unfavourable ecological conditions.

Approximately 13 million ha of infestations were treated mainly in the Western Region, out of which only 467 000 ha (3.6 percent) were treated in the Central Region. After experiencing a locust emergency for two years, the Commission recommended the establishment of an emergency fund of at least USD 500 000. The fund would quickly

assist countries at risk of being overwhelmed by swarms. The Secretary was requested to prepare a mechanism for managing the fund for discussion at the next Executive Committee meeting.

The session acknowledged the progress made, the publications produced, the regional and national training courses held, the research projects undertaken, and the new technologies introduced. The latter included a new version of the eLocust system (eLocust2), a handheld digital data logger for field observations and real-time data transfer from even remote places via satellite to the national locust information offices and DLIS at FAO headquarters. Most of these results were because of the excellent cooperation between the Commission, EMPRES/CR and DLIS.



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Graduates of the Desert Locust Management Diploma course at the University of Khartoum (2006)

The Secretariat also presented the first CRC-EMPRES website containing valuable reference documents, reports, publications and other resources for the member countries and other interested parties. Furthermore, the FAO Desert Locust Master Trainer Manual and kit had been produced in English and Arabic and was distributed to all member countries.

Donor support for the EMPRES/CR Programme was scheduled to end by December 2006 and CRC member countries were expected to maintain the major components of preventive locust management from their own resources. This would entail new and improved early warning systems, environmentally safer control options, regular staff training, campaign evaluation and contingency planning at the national and regional levels.

Following the transfer of the EMPRES/CR Coordinator to the Western Region in December 2005, the CRC Secretary assumed EMPRES/CR responsibilities for the remaining period. The Chairperson of the Commission acknowledged the excellent achievements of EMPRES/CR and appealed to all member countries to fully support the Secretary in a professional manner.

### **The 26<sup>th</sup> session (2008)**

Past locust developments and locust emergency response actions were discussed at the 26<sup>th</sup> session held in Muscat, Oman on 26–30 July 2008. A Desert Locust outbreak developed in Eritrea in December 2006 in which swarms subsequently spread to Sudan, Saudi Arabia and Yemen during March 2007.



Participants at the 26<sup>th</sup> CRC session held in Muscat, Oman on 26–30 July 2008 under the patronage of H.E. Khalfan bin Saleh Al-Na'abi

Although new response mechanisms made significant improvements in reaction speed compared with the 2003–2005 upsurge, the situation deteriorated further in Yemen during the summer because of the difficult and remote terrain, resistance from local beekeepers, unsuitable spray aircraft, and a lack of awareness and support by local authorities. Faced with a very dangerous situation, the CRC Secretary called an emergency meeting with the Locust Heads of the affected countries and FAO headquarters staff.

The fourth ad hoc emergency prevention consultation took place in Cairo on 9–11 September 2007 to discuss possible developments and outline a mitigation strategy. Swarms that formed in the summer spread to Oman, northern Somalia and Ethiopia in September and eventually reached Kenya in December for the first time in 50 years. The challenge in this critical situation was to mobilize rapid assistance to reinforce national locust control capacities. The session acknowledged that the unprecedented fast reaction from the UN Central Emergency Response Fund (CERF) in granting USD 2.7 million, Japanese assistance of USD 1.7 million to Eritrea, Ethiopia, Sudan and Yemen, WFP logistical support brokered by FAO headquarters, and pesticides donated by Mauritania allowed nearly 270 000 ha of infestations to be treated in the Central Region.



Participants at the fourth Locust Crisis Management Ad Hoc Meeting in Cairo in September 2007 organized by the Commission

These efforts were supplemented by DLCO-EA, which carried out aerial control operations in Eritrea (from the Sudanese side), Ethiopia, Kenya and northern Somalia (from the Ethiopian side). In addition, Sudan provided important support to Eritrea in terms of aircraft fuel and pesticides, and Saudi Arabia provided substantial assistance to Eritrea (USD 300 000) and to Yemen (USD 1.6 million) that was highly appreciated. It was these collaborative efforts that brought the situation back under control.

These examples emphasize the importance of smooth cooperation between countries and the role the Commission can play in brokering bilateral support in emergencies. They also show that preventive control can only succeed if it is based on the efforts of each country and if national locust control units have a high degree of autonomy. The risk of leaving an unsurveyed, open corridor for locust movements across the Gulf of Aden through northern Somalia, which severely affected Ethiopia and eventually Kenya, triggered heated discussions during the session. Eventually the meeting agreed to support survey and locust control operations in northern Somalia from the Commission's funds. Somaliland, not being internationally recognized, was so far not an official member of CRC. Despite the recommendations of the 25<sup>th</sup> session and despite the recently endured crisis situation, no agreement could be reached on an emergency fund of USD 500 000. After much discussion, the session agreed on a modest USD 100 000.

### **The 27<sup>th</sup> session (2010)**

The locust situation in the region had improved again by August 2009 so that the 27<sup>th</sup> session in Beirut, Lebanon on 20–24 September 2010 took place under less pressure. Progress had been made in publishing the Desert Locust Glossary in English and



Arabic on the CRC-EMPRES website. Support had been given to national, regional and interregional training courses as well as to M.Sc. scholarships. In collaboration with FAO headquarters, CRC organized RAMSES and eLocust2 workshops for national locust information officers in 2009 and 2010, a regional workshop on improving the electronic **D**esert **L**ocust **C**ontingency **P**lanning **A**ssistant (DeLCoPA) and a third field workshop to evaluate new spray equipment in 2009.

Arrears owed to the Trust Fund had been reduced to USD 505 774 by 2010 after cancellation of those of Sudan, Iraq and Lebanon by 50 percent. The available cash balance increased to USD 2 252 336. However, it was also noticed that some countries continued paying their contributions irregularly or late despite many reminders. The session discussed the emergency fund again and realized that USD 100 000 was not sufficient and an amount of USD 300 000 was recommended.

### **The 28<sup>th</sup> session (2012)**

At the 28<sup>th</sup> session in Jeddah, Saudi Arabia on 24–28 November 2012, the Commission thanked the outgoing Secretary, Mr Munir Butrous, who retired in April 2011, for his outstanding commitment to making the Commission more proactive and for the services he delivered to the member countries. The incoming Secretary, Mr Mamoon Al-Alawi, was welcomed. He started his work in November 2011.

The CRC Chairperson praised the productive cooperation with DLCO-EA concerning northern Somalia, and the good relationship with the other two FAO Desert Locust regional commissions, CLCPRO and SWAC. To help meet new challenges, the Secretariat initiated a consultancy in February 2012 to review the status of locust management in the Central Region and CRC's strategy of emergency prevention. First and foremost, the mission recommended vigorously to raise Desert Locust issues at FAO regional conferences and also bilaterally with Member Governments. It suggested to advocate jointly with the other Desert Locust regional commissions on implementing preventive Desert Locust management as a means to ensure food security.

The FAO Senior Locust Forecasting Officer highlighted financial obstacles that DLIS faced in maintaining its current level of services to member countries and the locust commissions. This could have extremely negative consequences for the early warning system and thus for locust crisis prevention as a whole. Given the gravity of the problem, the session reaffirmed the importance and critical role played by DLIS as funded by the FAO Regular Programme. In case of budget constraints, the Commission would consider providing partial financial support to ensure the sustainability of DLIS services, after the agreement of the other two commissions.



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The Secretary of the Commission, Mr Mamoon Al-Alawi since November 2011

The Yemeni delegate revealed that most of the infrastructure and supplies of the national Desert Locust Monitoring and Control Centre had been damaged or looted during fighting in Sana'a. He appealed to CRC member countries for help to re-establish the centre so that it could resume its activities as soon as possible. The meeting recommended assisting Yemen by preparing a proposal to donors for its rehabilitation.



The 28<sup>th</sup> CRC session was held in Jeddah, Saudi Arabia on 24–28 November 2012 and chaired by Mr Adan Soliman Khan (Saudi Arabia)

Considering the unchanged contribution rates of member countries over the past 30 years and inflation during this period, the session requested the Secretariat to strongly encourage member countries to increase their annual contributions. The session highly acknowledged the efforts made by Iraq to settle its arrears of USD 316 301.

### **The 29<sup>th</sup> session (2014)**

At its 29<sup>th</sup> session in Dubai, United Arab Emirates on 23–27 November 2014, the meeting focussed on a deteriorating locust situation. As a result of good summer rains and successful breeding, an outbreak developed in Sudan in October 2012 that spread to Egypt, Saudi Arabia and Eritrea. In March 2013, locust swarms were seen in the sky over Cairo and moved to Sinai and Israel while adult groups reached Lebanon and Jordan. Swarms from spring breeding in the interior of Saudi Arabia spread to Yemen. Subsequent breeding in interior and coastal areas caused swarms to form in late 2013, some of which moved to the Horn of Africa. In 2014, swarms spread from northern Somalia to Ethiopia where they were seen over Hargeisa and Addis Ababa. Nearly 700 000 ha were treated between November 2012 and October 2014 in the Central Region in order to bring the situation back under control.



The 29<sup>th</sup> CRC session was held in Dubai, United Arab Emirates on 23–27 November 2014 and chaired by Mr Heruy Asghdom (Eritrea)

Unfortunately, survey and control operations in Yemen were seriously affected by insecurity and internal strife, and operations were poor in northern Somalia because of weak national capacity. These shortcomings also affected the other countries in the region. Luckily, the Commission succeeded in securing USD 1.4 million in emergency support from Saudi Arabia. FAO's Technical Cooperation Programme (TCP) provided USD 1.5 million, the Islamic Development Bank (IDB) provided USD 300 000 and the United States Agency for International Development (USAID) assisted with USD 250 000. The funds contributed to locust operations in Egypt, Eritrea, Sudan and Yemen. The meeting noted with satisfaction the extraordinary allotment of USD 300 000 from Oman to the Commission's Trust Fund.

The FAO Senior Locust Forecasting Officer informed the participants of several new technical developments in locust information management. He explained that eLocust2 would be decommissioned and replaced soon by a more advanced eLocust3 version. National locust information officers had already been trained on the new device during an interregional training course in Agadir, Morocco in May 2014. In addition, he informed the meeting that a more powerful and updated version of RAMSES, called RAMSESv4, would replace the current 15-year-old version on 1 January 2015. The three regional locust commissions had contributed to the development costs of RAMSESv4.

In the Western Region, a proposed advanced financial governance mechanism under the Commission's Trust Fund had been developed that combines national and regional funds for preventive control with the regional emergency fund. It was agreed that the Central Region considers a similar system.

The CRC meeting also agreed to establish a Regional Emergency Fund of USD 150 000 under the Commission's Trust Fund instead of the USD 300 000 recommended at the 27<sup>th</sup> session. However, member countries were encouraged to establish their own national Desert Locust emergency funds. As a follow-up to the 28<sup>th</sup> session, it was

recommended to double the annual contribution rates of the countries. The CRC Secretary was requested to address the recommendation to the governments of the member countries.

The delegates were informed that the 30<sup>th</sup> CRC session scheduled for February 2017 would also mark the 50<sup>th</sup> Anniversary of the establishment of the Commission. The delegates endorsed the proposal made by the Secretary to prepare a book on the history of the Commission and a documentary movie, and to invite all member countries at the expense of the Commission's Trust Fund.



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The regional master trainer from Egypt demonstrates proper calibration of a vehicle-mounted ULV sprayer during a national survey and control training course organised by the CRC in Yemen (2007)

## CRC Sessions

No.	Year	Venue	Chairpersons	Secretariat
1	1969	Baghdad	Haider Al-Haidari (Iraq) Gharib K. Al-Gharib (Kuwait)	Gurdas Singh (FAO, Rome), M.F. Lehera (FAO-IDLCC, Jeddah)
2	1971	Beirut	Antoine Moawad (Lebanon), Khalil Lubani (Jordan)	R. Skaf (FAO, Rome), Ahmed Khasawneh (FAO-IDLCC, Jeddah)
3	1972	Amman	Khalil Lubani (Jordan), Gharib K. Al-Gharib (Kuwait)	Gurdas Singh (FAO, Rome), Ahmed Khasawneh (FAO-IDLCC, Jeddah)
4	1973	Cairo	Salim B. Hadramy (Saudi Arabia), Mostafa El-Nahas, (Egypt)	Gurdas Singh (FAO, Rome), Ahmed Khasawneh (FAO-IDLCC, Jeddah)
5	1974	Jeddah	Tahir Obaid (Saudi Arabia), Ahmed S. Al-Ghaithiy (Oman)	Gurdas Singh (FAO, Rome), Ahmed Khasawneh (FAO-IDLCC, Jeddah)
6	1975	Kuwait	Gharib K. Al-Gharib (Kuwait), Dawood Ali (Oman)	J. Roy (FAO, Rome), Ahmed Khasawneh (FAO-IDLCC, Jeddah)
7	1976	Rome	Abdel M. H. Karrar (Sudan), Mohamed F. Thabet (Qatar)	J. Roy (FAO, Rome), Ahmed Khasawneh (FAO-IDLCC, Jeddah)
8	1977	Doha	Sultan Al-Kuwari (Qatar), Mohamed Al-Khalifa (Bahrain)	J.S. Gill (FAO, Rome), Ahmed Khasawneh (FAO-IDLCC, Jeddah)
9	1978	Baghdad	Ala'a Eldin D. Ali (Iraq), Ahmed Al-Masoum (UAE)	J. Roy (FAO, Rome), Ahmed Khasawneh (FAO-IDLCC, Jeddah)
10	1979	Rome	Salim B. Hadramy (Saudi Arabia), Gharib K. Al-Gharib (Kuwait)	J. Roy (FAO, Rome), Ahmed Khasawneh (FAO-IDLCC, Jeddah)
11	1980	Amman	Hani Haddadin (Jordan), Ala'a Eldin D. Ali (Iraq)	R. Skaf (FAO, Rome), Ahmed Khasawneh (FAO-IDLCC, Jeddah)
12	1981	Rome	Abel Moneim H. Karrar (Sudan), Nasser El-Muafa (Yemen Arab Republic)	R. Skaf (FAO, Rome), Ahmed Khasawneh (FAO-IDLCC, Jeddah)
13	1983	Rome	Ibrahim A. Madini (Saudi Arabia), Samir N. Girgis (Egypt)	R. Skaf (FAO, Rome), Ahmed Khasawneh (FAO-IDLCC, Jeddah)
14	1986	Rome	<i>no session</i>	<i>no session</i>
15	1988	Rome	Zafer Alyafi (Syria), Samir N. Girgis (Egypt)	Lucas Brader (FAO, Rome), Ahmed Khasawneh (FAO-IDLCC, Jeddah)
16	1989	Doha	Abdullah M. Al-Kawari (Qatar), Shawkat Kasim (Jordan)	Abderrahman Hafraoui (FAO, Rome), Ahmed Khasawneh (FAO-IDLCC, Jeddah)
17	1990	Cairo	Mamdouh M. Zuhair (Egypt), Salem B. Hadramy (Saudi Arabia)	Abderrahman Hafraoui (FAO, Rome), Ahmed Khasawneh (FAO-IDLCC, Jeddah)
18	1992	Cairo	Mamdouh M. Zuhair (Egypt), Abdullah A. Abdullah (Sudan)	Abderrahman Hafraoui (FAO, Rome)
19	1993	Cairo	Mohamed S. Simary (Egypt), Ahmed M. Al-Henai (Oman)	Abderrahman Hafraoui (FAO, Rome), Mahmoud Taher (FAO-RNE, Cairo)
20	1994	Cairo	Yacoub A. Yacoub (Saudi Arabia), Zafer Al-Yafie (Syria)	Abderrahman Hafraoui (FAO, Rome), Mahmoud Taher (FAO-RNE, Cairo)
21	1996	Cairo	Jaber Al-Shahri (Saudi Arabia), Youssef Al-Tarakmah (Kuwait)	Abderrahman Hafraoui (FAO, Rome), Mahmoud Taher (FAO-RNE, Cairo)
22	1998	Cairo	Ali Mohamed Ali (Sudan), Abdullah M. Abdalla (UAE)	Abderrahman Hafraoui (FAO-Rome), Mahmoud Taher (FAO-RNE, Cairo)
23	2002	Damascus	Khalil A. Halim (Syria), Hamood Ben Derwish Al-Hasani (Oman)	Abderrahman Hafraoui (FAO, Rome), Munir Butrous (FAO-RNE, Cairo)
24	2004	Jeddah	Ghazi A. Hawari (Saudi Arabia), Abdullah S. Al-Khunji (Qatar)	Clive Elliott (FAO, Rome), Munir Butrous (FAO-RNE, Cairo)
25	2006	Doha	Abdullah S. Al-Khunji (Qatar), Mamoon Al-Alawi (Oman)	Clive Elliott (FAO, Rome), Munir Butrous (FAO-RNE, Cairo)
26	2008	Muscat	Mamoon Al-Alawi (Oman), Mr Hameed Al-Sheikh (Iraq)	Christian Pantenius (FAO, Rome), Munir Butrous (FAO-RNE, Cairo)
27	2010	Beirut	Imad Nahhal (Lebanon), Adnan S. Khan (Saudi Arabia)	Keith Cressman (FAO, Rome), Munir Butrous (FAO-RNE, Cairo)
28	2012	Jeddah	Adnan S. Khan (Saudi Arabia), Saeed Ali Al-Awash (UAE)	Annie Monard (FAO, Rome), Mamoon Al-Alawi (FAO-RNE, Cairo)
29	2014	Dubai	Heruy Asghdom (Eritrea), Adel Al-Shaibani (Yemen)	Annie Monard (FAO, Rome), Mamoon Al-Alawi (FAO-RNE, Cairo)



## 1.7 The EMPRES Desert Locust Programme (1997–2006)

As previously mentioned, the 106<sup>th</sup> session of the FAO Council in May 1994 adopted the Emergency Prevention System for Transboundary Animal and Plant Pests and Diseases (EMPRES) as a Special Programme of the Director-General of FAO. Priority was given initially to the crop pest, the Desert Locust, and to the livestock disease, rinderpest. The EMPRES Desert Locust component was initiated first in the Central Region (CR) as most of the previously recorded Desert Locust plagues had originated from the areas around the Red Sea.



The EMPRES/CR region

The major concerns of FAO and its partners were the high costs of reactive locust control and the potential economic benefits that could result from effective preventive control. In addition, the safety and environmental impact of the chemical pesticides used in locust control campaigns, and the capacities of the existing national and regional organizations to deal with the Desert Locust problem in outbreak areas, were also important elements in the programme. The primary objective of the Desert Locust programme in the Central Region (EMPRES/CR) was to *minimize the risk of plagues emanating from the Central Region of the Desert Locust distribution area through well-directed surveys and timely, environmentally sound interventions in order to mitigate food security concerns in the Central Region and beyond.*

The programme was designed to strengthen national capacities in early warning, early reaction and applied research. EMPRES activities concentrated on improving survey operations, establishing an efficient information network, strengthening campaign arrangements and contingency planning, improving the safe use and environmental

impact of pesticides, and contributing to the development of improved methods and strategies of Desert Locust management. EMPRES/CR was a collaborative programme in which the nine frontline locust-affected countries of the Central Region, namely Djibouti, Egypt, Eritrea, Ethiopia, Oman, Saudi Arabia, Somalia, Sudan, and Yemen, the regional organizations CRC and DLCO-EA, the donors (USAID and Dutch-, German-, and Swiss-Cooperation) and FAO, participated in the development of sustainable Desert Locust prevention strategies. Other development partners such as those from Belgium, Japan, Norway, Sweden and the United Kingdom provided assistance bilaterally or to specific areas.

The donor support to the programme was projected for a period of ten years, divided into three phases of three to four years each. The responsibility for preventive locust management would rest primarily with the national locust control organizations while coordination activities were expected to be undertaken by CRC.

Each participating country and DLCO-EA nominated an EMPRES Liaison Officer (ELO) as the focal point for EMPRES/CR activities. ELOs were expected to meet regularly to coordinate activities and to prepare a workplan for the immediate future. The UN Volunteer, Mr Charles Mushi, based in northern Somalia acted as ELO for Somalia.

**EMPRES/CR Liaison Officers Meetings**

<b>No.</b>	<b>Date</b>	<b>Venue</b>	<b>Chairperson</b>
1	May, 1995	Addis Ababa, Ethiopia	Niek van der Graaff
2	August, 1995	Cairo, Egypt	Niek van der Graaff
3	April, 1996	Sana'a, Yemen	Abderrahman Hafraoui
4	November, 1996	Asmara, Eritrea	Clive Elliott
5	September, 1997	Cairo, Egypt	Clive Elliot
6	December, 1998	Cairo, Egypt	Abderrahman Hafraoui
7	November, 1999	Sana'a, Yemen	Abderrahman Hafraoui
8	October, 2000	Muscat, Oman	Abderrahman Hafraoui
9	October, 2001	Khartoum, Sudan	Clive Elliott
10	October, 2002	Jeddah, Saudi Arabia	Abderrahman Hafraoui
11	October, 2003	Djibouti, Republic of Djibouti	Abderrahman Hafraoui
12	October, 2004	Hurghada, Egypt	Christian Pantenius
13	December, 2005	Sana'a, Yemen	Clive Elliott
14	November, 2006	Muscat, Oman	Christian Pantenius

An EMPRES/CR Steering Committee was established to provide overall supervision of the programme, to ensure political and financial support, and to assist in the coordination between EMPRES/CR, CRC, DLCO-EA and DLCC. The steering committee was composed of donor representatives, FAO, the regional organizations and high-level representatives from three locust-affected countries on a rotating basis.

### EMPRES/CR Consultative Committee Meetings

No.	Date	Venue	Chairperson
1	December, 1998	Cairo, Egypt	Niek van der Graaff
2	November, 1999	Rome, Italy	Niek van der Graaff
3	December, 2000	Rome, Italy	Niek van der Graaff
4	January, 2002	Cairo, Egypt	Abderrahman Hafraoui
5	May, 2003	Rome, Italy	Niek van der Graaff
6	November, 2005	Cairo, Egypt	Clive Elliott

Pilot EMPRES/CR activities started with the first meeting of the national ELOs in Addis Ababa in May 1995 in which a workshop was convened to address issues related to Desert Locust surveys and reporting. To facilitate the distribution of locust reports, high priority was given to establishing reliable e-mail connections in the countries.



Participants at the fifth EMPRES/CR Liaison Officers Meeting in Cairo on 23–25 September 1997

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The second (August 1995), third (April 1996) and fourth (November 1996) ELO meetings reviewed the status of the pilot projects related to early warning, remote sensing, economic studies, early reaction and research. It was concluded that the EMPRES/CR Programme should develop as soon as possible a contingency plan for the frontline countries and should focus on testing alternative control methodologies such as mycopesticides and chitin-synthesis inhibitors (insect growth regulators).

At the fourth ELO meeting, the annual progress reporting and work planning formats and procedures were discussed. It was decided that a systematic review of past activities should be carried out in future ELO meetings so that unaccomplished or pending activities were properly identified.

### **Phase I (1997–2000)**

The programme eventually became operational in 1997 with the recruitment of the first EMPRES/CR staff members, Mr Munir Butrous as National Professional Officer (NPO-Sudan) in October 1996, followed by Mr Jan Breithaupt as Associate Professional Officer (APO) based in Sana'a, Yemen in February 1997, Mr Allan T. Showler as Programme Coordinator (PC) in March 1997 and Mr Fuad Bahakim as National Professional Officer (NPO-Yemen) in May 1997.



The EMPRES/CR team meeting in Sana'a, Yemen in February 1999.

Rear (R-L): Charles Mushi (UNV), Allan T. Showler (EMPRES Coordinator), Naglaa Salim (Clerk), Tsedeke Abate (Research Officer), Christian Pantenius (Senior Field Officer), Fuad Bahakim (NPO–Survey), Yahia Al-Aloumani (Driver);  
front kneeling: Jan Breithaupt (APO), Munir Butrous (NPO–Control)

In July 1997, a Senior Field Officer (SFO), Mr Christian Pantenius, was recruited and posted to Addis Ababa, Ethiopia. With the enrolment of Mr Tsedeke Abate on July 1998 as International Research and Development Expert, based in Sana'a, Yemen, the EMPRES/CR team was complete. The seat of the EMPRES/CR Programme was set up in Asmara, Eritrea at the Ministry of Agriculture.

When the fifth ELO meeting was held in Cairo on 23–25 September 1997, most of the EMPRES/CR staff were in place and had started work. The Senior Migratory Pest Officer from FAO headquarters, Mr Clive Elliott, in his function as the responsible

technical officer overseeing the programme, acted as Chairperson of this meeting. The ELOs from eight EMPRES/CR member countries and DLCO-EA, the CRC Secretary, Mr Mahmoud Taher, and three FAO-EMPRES staff all attended. Mr Mohamed Abdallahi Ould Babah from the national Locust Control Centre in Mauritania was invited as a guest and representative of the envisaged EMPRES Programme in the Western Region. Mr Elliott introduced the new EMPRES/CR team members and informed the participants that USD 8.1 million, out of the projected USD 9.97 million, had been allocated by donors and FAO to the programme. The meeting reviewed the activities carried out under the various programme components and the progress made. In view of the short time between the fourth ELO meeting and the programme becoming operational, progress was comparatively limited.



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Participants at a national survey and control training course in Kosti, Sudan in October 1998

In the following months, EMPRES/CR concentrated on the calibration of remotely-sensed vegetation maps, control-free simulation of the 1992–1994 upsurge, the analysis of the cost-benefit relationship of Desert Locust control and improved communication between the participating countries. Several training events were organized by the programme that included the development of a comprehensive training concept for various target groups. This provided the basis for the training materials package, the Desert Locust Master Trainer Manual, developed in cooperation with NRI and DLIS. The manual is still the standard training tool kit used today in locust-affected countries for training their staff. The RAMSES GIS used for management and analysis of national locust and ecological data, and national contingency planning were also first introduced by EMPRES/CR.

The first meeting of the steering committee, the EMPRES/CR Consultative Committee, was convened in Cairo on 9–10 December 1998 and chaired by Mr Niek van der Graaff, Chief of the Plant Protection Service (AGPP) at FAO headquarters.



The meeting revealed several issues concerning the economics of Desert Locust control. The proposed core research team approach, progress reporting and work planning were also discussed. Some external events had occurred that were beyond the control of the programme management and affected smooth implementation of activities, such as armed conflicts in locust areas. The involvement and responsibilities of the ELOs within the programme led to concerns from the participating countries and the interaction and coordination of EMPRES activities with the other regional organizations, CRC and DLCO-EA, remained unresolved. In fact, some worries raised at the 20<sup>th</sup> CRC session in 1994 were to a certain extent substantiated. FAO reacted to the growing concerns from various parties in respect to the lack of transparency and the overall performance of EMPRES/CR by initiating an independent evaluation one year before the first phase was due to come to an end in early 2001. The first evaluation of the EMPRES/CR Programme was conducted from 19 July to 20 August 1999. In short, the start of EMPRES/CR was not an easy one.



Participants at the eighth EMPRES/CR Liaison Officers Meeting hosted by the Government of Oman on 22–26 October 2000

The evaluation noted that a number of issues in the overall programme design and its implementation contributed to uncertainty about the management and supervisory arrangements of the programme, its general modus operandi, and its institutional future. Despite these weaknesses, EMPRES/CR was widely commended by participating countries and institutions for its contribution to improved Desert Locust management. The concept of prevention was also generally supported. The evaluation considered the first phase as a pilot period in which approaches were tested, collaborators tried out, institutional links developed and the concept refined. Another consequence of the findings was that the first EMPRES Coordinator resigned in October 1999 and the SFO, Mr C. Pantenius, took over the managerial functions as acting Programme Coordinator.

Several recommendations of the Mission regarding EMPRES/CR work planning, reporting, the roles of the ELOs, and the relationship to CRC were addressed immediately. Already the 7<sup>th</sup> ELO meeting in Sana'a, Yemen in November 1999 was organized in the form of an interactive workshop in which the achievements and difficulties of the programme were assessed. Recommendations for the next year's workplan were jointly formulated with the expected results and potential weaknesses identified. This approach permitted the ELOs to identify better their national interests within EMPRES/CR and to develop a more precise understanding of the role to be played by national programmes. To improve the monitoring and evaluation of progress, a new reporting format was introduced based on objectively verifiable performance indicators. By February 2000, the original programme document was revised and distributed to all stakeholders, and a joint CRC-EMPRES/CR workplan was prepared in March 2000.



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Joint programme and work planning using the “card method”

A participatory planning workshop for phase II of EMPRES/CR was organized in El-Tur, Egypt on 26–30 March 2000. Principles of results-based management (RBM) were used for the planning and monitoring of the second phase. All the relevant representatives from the member countries and from most collaborating development partners attended the workshop. The workshop developed the basic elements of an implementation document for phase II, which was compiled and distributed to stakeholders in May 2000.

The participants of the third EMPRES/CR Consultative Committee meeting in December 2000 acknowledged with satisfaction the significant achievements of EMPRES/CR since its first evaluation and endorsed the report. The work plan for the first year of phase II, based on the outcome of the eighth ELO meeting, was approved with only minor changes.

## Phase II (2001–2003)

The second phase of EMPRES/CR started in January 2001 with the objective that “*components of preventive Desert Locust control management are developed and adopted [by participating countries and regional organizations] by 2003*”. The expected results by the end of phase II were stated as:

- Operational mandate of different regional organizations in Desert Locust management harmonized;
- National and regional communication networking enhanced;
- Desert Locust early warning and information systems improved;
- Desert Locust survey procedures of the member countries improved;
- Contingency plans available and implemented;
- Efficient and environmentally safer control methods introduced;
- Systematic methods of campaign evaluation developed.



An incomplete hardened cuticle as a result of the effects of growth regulators applied on a gregarious locust hopper

During the first year of phase II, major changes in the programme’s setup took place with long-term consequences for the future of CRC. In August 2001, the EMPRES/CR NPO, Mr Munir Butrous, was appointed as Secretary of CRC and the EMPRES/CR SFO, Mr Christian Pantenius, was appointed as Programme Coordinator. As recommended by the EMPRES/CR evaluation mission in 1999, the seat of the programme coordination was transferred from Asmara to Cairo in September 2001. The move was expected to improve collaboration between EMPRES/CR and CRC and ultimately to contribute to the sustainability of EMPRES concepts. In mid-2001, the German Technical Cooperation Agency (GTZ) seconded Mr Hans Wilps, as Visiting Scientist, to EMPRES/CR to assist in field-testing alternative control options during phase II.

Only two years after the first evaluation, EMPRES/CR was evaluated for a second time in August 2001 because of a special request from the Director-General of FAO to assess the overall EMPRES Programme, including the Desert Locust component in the Central Region. Despite the various external factors that had contributed to delays in some areas, most of the planned activities had been accomplished with satisfactory results. The evaluation noted that significant improvements had been made in all aspects of the various EMPRES/CR Programme components over the past years.



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The locust information officer from Eritrea demonstrating the RAMSES geographic information system to a visitor

Further good progress in almost all major aspects of developing preventive management was achieved during phase II. The enhanced collaboration with the various partners of EMPRES/CR, both regionally and interregionally, contributed significantly to the good performance. Notably, the close interaction and routine consultation between the Programme Coordinator and the CRC Secretary in all technical and administrative aspects resulted in increased cost-sharing of important activities. This included research programmes, joint cross-border surveys, fellowships, the Desert Locust Management Diploma course at the University of Khartoum, regional and national staff training, the development and production of various Standard Operating Procedures (SOP) and pocket-sized field references. It also involved progress in extending important EMPRES/CR components to the non-EMPRES countries of the Central Region.

The National Locust Control Units (NLCU) became increasingly confident in organizing national training courses by themselves. This was helped by EMPRES/CR support for several regional and interregional training courses through which national master trainers became qualified. The necessary tools and training kits for master trainers were provided to all member countries. The integration of technical components into the national locust programmes gained momentum. Most participating EMPRES



countries incorporated the recommended survey and locust information technologies such as RAMSES, the use of high frequency (HF) radios, the interpretation and use of satellite imageries, and the publication of monthly national Desert Locust Bulletins into their national programmes. Consequently, locust reporting by most countries to DLIS improved significantly in quality, regularity and timeliness over the years. It was therefore foreseeable that the targets set with regard to the early warning component would be attainable during phase II. The active involvement of the Senior Locust Forecasting Officer at FAO headquarters contributed to the good progress made in this area.



Exercising calibration of hand-held ULV sprayer in Yemen (2007)

In an effort to improve the practicability of regional and national contingency planning arrangements, a regional contingency planning workshop was organized in Borg El Arab, Egypt in February 2002. One outcome of the workshop was the establishment of a regional ad hoc emergency prevention body to be called upon in the onset of a crisis. An initial allocation of USD 100 000 was made by CRC for emergency pesticide reserve stocks. DLCO-EA agreed to produce monthly updates on the status of its air fleet. The workshop's discussions ultimately led to the development of two new technologies, the electronic Desert Locust Contingency Planning Assistant (DeLCoPA) and the online Locust Emergency Response Toolkit (eLERT). The Country Focus Programmes (CFPs) had a key function in EMPRES/CR by analysing the main operational capacities and weaknesses of each country's preventive Desert Locust management system and for suggesting improvements. The approach was considered the best way to develop and maintain national locust control capacities during recession periods as opposed to a "one size fits all" style.



In March 2003, the second phase of EMPRES/CR was evaluated. The evaluation concluded that important steps towards the development of sustainable preventive control had been made, including early detection technologies, the introduction of biopesticides, and staff capacity building while only limited progress had been achieved on research initiatives within the region and socio-economic studies. EMPRES/CR had also failed to establish a system for verifying best practices for survey and control. The evaluation recognized disparities in the adoption of EMPRES/CR components by different national programmes. Some countries had proved fully committed to the preventive locust management approach while others lagged behind in the process of adopting elements such as contingency planning, early reaction and alternative control methods.



Desert Locust survey on the southern coastal plains of Yemen near Zinjibar (2005)

As it was felt that not all aspects of preventive Desert Locust control would be in place in all countries at the end of phase II, a third phase of three years was recommended. This would address the unfinished components of phase II within the overall objective of establishing a sustainable locust management system in the Central Region. Based on the evaluation, a phase III planning workshop was held in Rome on 19-23 May 2003 in connection with the fifth Consultative Committee meeting. The meeting and the planning workshop were attended by senior officials from the member countries, representatives from the donor community and FAO. The participants came to the conclusion that the aim of phase III of EMPRES/CR should focus on gradually transferring the programme's responsibilities to CRC and its member countries and on developing and introducing mechanisms to improve the preparedness levels of the national and regional entities in preventing locust emergencies from getting out of control.

### Phase III (2004–2006)

The third phase of EMPRES/CR started in January 2004 with the purpose of “*improved preventive Desert Locust control management approaches [are] reinforced on [a] sustainable basis*” and that its components would be taken over by CRC and the participating countries by the end of this phase.

When the third phase started, the EMPRES/CR team had been reduced from its original level of seven professional staff to just two. This small team was confronted with the challenge of providing evidence that the strategy of plague prevention would work on an operational basis not just in theory. EMPRES/CR had benefitted much from the 1998–2003 recession and was able to concentrate fully on the development and introduction of various standard procedures and technologies for preventive locust control. But in 2003, widespread and unusually heavy rainfall triggered four simultaneous outbreaks in the summer breeding areas of Africa, ending the calm period.

In early February 2004, it became obvious that the Desert Locust situation was likely to deteriorate further, which could potentially exhaust available resources in some of the affected countries. EMPRES/CR and CRC rapidly convened an ad hoc emergency prevention meeting in March 2004 with the immediately concerned countries: Eritrea, Saudi Arabia, Sudan and Yemen. A second meeting was held in September 2004. The meetings assessed the locust situation and discussed likely scenarios during the forthcoming season. Appropriate counter measures were identified according to the predicted locust breeding and migration month by month. The available and pledged resources were reviewed and agreement was reached on a detailed regional action plan. Based on the regional plan for the summer campaign 2004 and winter campaign 2004–2005, Eritrea, Saudi Arabia, Sudan and Yemen prepared their national operational plans, which were submitted to their government authorities for adoption, and neighbouring countries were informed of the intended actions.



Desert Locust swarms over Cairo on  
November 17, 2004

The ad hoc meetings were considered very useful in providing guidance for the planning of the individual national actions, the sourcing of additional materials and the pre-positioning of equipment and teams. Emergency TCP assistance had been

mobilized promptly and the campaigns were conducted in a comparatively more coordinated manner. As a result, the concerned national LCUs managed to contain the locust infestations by May 2004. Particularly important was that national locust teams in Saudi Arabia succeeded in preventing the escape of locust swarms into the spring breeding areas in the interior of the country. This could have posed a very dangerous situation not only for the Central but also for the Eastern Region. Though the locust situation was basically brought under control in the Central Region by mid-2004, the danger that the upsurge could develop into a major plague was far from over.



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Desert Locust control operations on the Red Sea coast of Eritrea near Marsa Gulbub

In fact, unusually strong and persistent southwesterly winds across Libya during October 2004 caused immature Desert Locust swarms to move from the northern Sahel in West Africa towards northeast Libya near Tubruk and eventually to Egypt. On 28 October, the first swarms were reported in northwest Egypt. By mid-November 2004, northwesterly winds carried the swarms towards the southeast and a large swarm appeared over Cairo on 17 November. Some of the locusts moved to the Sinai Peninsula while others continued southeast towards the Red Sea coast where they eventually reached winter breeding areas near the Sudanese border.

Besides managing this alarming situation, EMPRES/CR continued building all aspects of national capacities. In close cooperation with DLIS, the national locust early warning and communication networks were improved by providing the LCUs with new data transfer technologies such as a handheld eLocust data logger and a mobile HF radio modem for wireless transfer of the field data. As satellite-based communication technologies were becoming more affordable, it became obvious that such a system was required for further improving locust early warning. In 2004, Sudan tested the next eLocust generation, eLocust2, which had an integrated GPS and the ability to transmit survey and control data via satellite from anywhere in the field to the LCU in

less than a few minutes. The eLocust2 system was distributed to all frontline countries and became fully operational in 2006. After ten years of service, this was replaced by eLocust3 in 2015.



Mr Felege Elias (DLCO-EA) training Somali locust officers on the eLocust2 device

In 2005, the programme experienced two major events. First, the routine evaluation of phase III was conducted from 12 September to 11 October. Second, the handing over of the programme's responsibilities to the CRC Secretariat became effective with the transfer of the EMPRES/CR Programme Coordinator to Dakar, Senegal in December.

The evaluation noted important achievements in integrating preventive management components into the national programmes. Despite the generally positive trend, some constraints were also reported, particularly concerning the uneven use of some of the technologies and preventive control approaches in some of the countries. It was felt that economic or political circumstances did not always allow the full use of all components for either technical or structural reasons. Some technologies and biocontrol approaches were not, or not yet, applicable in some countries. Nevertheless, it was concluded that the majority of the participating countries had adequately adopted most of the key components. By the end of phase III, the overall adoption rate by the participating countries, including Somalia, of improved operating procedures and technologies reached more than 70 percent on average.

EMPRES/CR assisted the Commission in developing the CRC-EMPRES website, which was presented at the sixth Consultative Committee meeting in November 2005 and went online in June 2006. The website aimed to provide member countries and other interested parties with information about ongoing and past activities in the Central Region and to facilitate easy access to important technical references, reports, forms, and guidelines on various aspects of preventive Desert Locust management. The



CRC-EMPRES website continues to be operational although it now has a new look and format. At the 25<sup>th</sup> session of the Commission in Doha, Qatar (26 May to 2 June 2006), it was decided to merge the ELO meetings with those of the CRC Executive Committee as it was felt that the objectives of both meetings, such as monitoring the implementation of preventive control tactics and regional work planning, were similar. Consequently, the 14<sup>th</sup> ELO meeting held in Muscat, Oman, on 4–8 November 2006 marked the end of the ten-year existence of EMPRES/CR but its legacy lives on in many ways.



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Participants at the sixth EMPRES/CR Consultative Committee Meeting in Cairo, Egypt on 13–15 November 2005 with the presence of the Dutch and American donor representatives to the programme

## **Conclusion**

What did the EMPRES/CR Programme achieve in promoting preventive locust control? What did the programme contribute to a better performance of CRC and its member countries in managing Desert Locust populations more effectively, at less cost and in an environmentally less harmful manner? The idea of prevention was first voiced a long time ago and it took many more years of hard work by many people to determine its basic characteristics. Many, sometimes controversial, debates were conducted among experts on the question of whether the prevention of Desert Locust plagues was a practical and economic option.

The EMPRES/CR Programme focussed on rapid action based on the early detection of dangerous locust infestations even in remote areas. This was achieved by supporting improved survey operations, more efficient information networking, remote sensing and new data transmission and management technologies. The rapid intervention capacities



of the participating countries were strengthened to ensure timelier, more targeted, more effective and environmentally safer control interventions. The programme provided support to applied research in areas of biocontrol, population dynamics, survey methodology, barrier treatment, the economic impact of locust control, and addressed environmental safety concerns. About 30 studies and research projects were supported by EMPRES/CR, and critical organizational and operational aspects of Desert Locust control were addressed. The latter included more appropriate campaign planning and contingency arrangements to enhance more timely mobilization of the necessary resources when threatening situations arose.

The programme also contributed to human capacity building through intensive international, regional, and national training programmes for various target groups on relevant subjects. More than a 1 000 national locust control officers and auxiliary staff, such as locust scouts and drivers, were trained and retrained on survey and control (674 staff trained), survey and reporting (221), training of national master trainers (60), radio operation (26) and locust data management (59) during the EMPRES/CR period.



Rearing locusts for testing the efficacy of biopesticides at the ICIPE station in Port Sudan

Despite these achievements, EMPRES/CR did not meet all expectations in certain important aspects. During the recession period, it was more difficult to test and promote biocontrol technologies than had been hoped. The conditions for field-testing the entomopathogenic fungi *Metarhizium anisopliae* var. *acridum* were in most cases inadequate and did not provide solid results. However, it was demonstrated that a dose rate of 50 g of spores per ha had a reasonable impact on the Desert Locust. If properly applied, the technique could be used with good results in ecologically sensitive areas in which it would otherwise not be advisable or might even be illegal

to use conventional chemical insecticides. The acceptance of biocontrol by national locust control organizations remained limited by the end of the programme. There was the general fear that the hopper bands would continue causing unacceptable damage because *Metarhizium* does not show an immediate effect on treated hoppers as compared with chemical pesticides. In fact, the actual mortality becomes visible only 4–10 days after treatment, depending on environmental conditions. But it should be noted that using only classical mortality criteria is not necessarily adequate in the case of assessing biocontrol tactics. Other effects of biocontrol such as reduced feeding after infection, increased susceptibility to predation, secondary pickup and cross-contamination within the locust population and the externalities of chemical control should also be taken into account and addressed more vigorously in the discussions.



Semi-field trials with biopesticides conducted near Port Sudan (2003)

The results of the trials of the adult pheromone phenylacetone nitrile (PAN) on reared hoppers were not entirely satisfactory. PAN, by breaking the cohesion of gregarious hopper bands, would make individual nymphs more easy prey for predators and more susceptible to other control agents<sup>[3]</sup>. PAN showed the expected effects on gregarious hoppers under semi-natural trial conditions. Furthermore, mixed with chemical pesticides, the recommended application rate could be reduced by 60 percent. But the results of these trials left doubts regarding the data, the viability of the approach under operational conditions and its possible ecotoxicological as well as legal implications.

EMPRES/CR invested much effort in examining the economics of Desert Locust management strategies and supported several economic models, case studies and organized expert consultations. It proved difficult to ascertain the economic advantages

*[3] Hopper aggregation is induced by specific nymphal pheromones, which are different from the adult pheromone make-up. The exposure of gregarious hoppers to the adult pheromone, and specifically to its major component, PAN, triggers behavioural and physiological changes. The hoppers stop marching in an organized manner, they become hyperactive and disoriented, feed less, and show increased level of cannibalism.*

and disadvantages of reactive versus preventive locust control and of alternative options such as crop loss insurance schemes in the absence of national control structures. It was impossible to quantify and qualify the economic returns and potentially prevented crop losses and damaged livelihoods because of the lack of reliable data. Experts accepted that locust swarms could cause devastating crop losses and social hardship in some cases, but argued that the overall impact of these losses on national economies remained marginal. The more abundant rains during plague situations produced better yields that compensated for the damage, and the costs for curative control far exceeded the value of the safeguarded harvests.



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The effects of the fungus *Metarhizium anisopliae* var. *acridum*, a selective biopesticide in which a fungus penetrates the insect cuticle and starts to grow inside the host to eventually kill it

The uncertainty in retrospectively estimating damage levels caused by past locust plagues and in quantifying potentially averted losses made it difficult to reach clear-cut conclusions. The proposed option to introduce insurance schemes was considered as impracticable and politically unacceptable, not least because of the complications such a system would entail particularly in less developed countries. The locust control issue was therefore understood as a public good of national, regional and even global concern because the control of a transboundary pest imposes negative externalities on the country of origin while also protecting neighbouring countries. In the absence of more robust scientific data to underpin the arguments, EMPRES/CR did not come to a decisive conclusion about the theoretically most beneficial option to compensate for crop losses and livelihood risks. It therefore advocated, unless proven otherwise, the concept of preventive control as an economically appropriate, feasible and politically acceptable approach. Nevertheless, by addressing various vital technical, economic and operational questions of prevention, the EMPRES/CR Programme could change the way that locusts were managed at the national and regional

levels. Particularly the benefits of investing in developing human capacity, regional cooperation, early warning and contingency planning as part of the preparedness efforts became evident during the events of the Desert Locust upsurge in 2003–2005. Earlier detection, a more rapid response, faster mobilization of additional resources in a critical transition phase, the environmental benefits and the costs for control operations were seen to be critical elements of effective preventive control. But once established, preventive management structures are subject to continuous adjustment in the light of scientific, technical, and operational advances and their political context. The development, introduction and the use of new tools such as new remote sensing products, GIS, electronic data processing and transmission systems, and biopesticides were examples of these advances. But technologies and specific devices need to be continuously reviewed, renewed, updated and replaced on a regular basis. This process cannot be left to national locust control units because any changes must be compatible regionally and also interregionally. This requires regional, interregional and international dialogue to stimulate innovation and to ensure standardisation and adoption of new technologies and approaches.

Last, but not least, agreeing on the principles and methods of upsurge and plague prevention is perhaps simpler and might easily be achieved among technical people. Governments, on the other hand, may have different agendas and goals that may not necessarily support the idea of prevention in periods when national priorities are changing and no locust plagues are being encountered. The interest in maintaining and investing in preventive locust control during recession periods may be reduced to the eventual detriment of livelihoods of the most vulnerable people when the next plague comes along. Past events have shown that a new Desert Locust plague can develop rapidly at any time. Here, CRC has its most prominent role to play: maintaining momentum and alertness within its member countries and the international community while building on what EMPRES/CR achieved.

### The EMPRES/CR Team

Name	Position	Duty Station	Period
Munir Butrous	National Professional Officer	Khartoum, Sudan	October 1996–August 2001
Jan Breithaupt	Associated Professional Office	Sana'a, Yemen; Addis Ababa, Ethiopia	February 1997–August 2000
Allan T. Showler	Programme Coordinator	Asmara, Eritrea	March 1997–October 1999
Fuad Bahakim	National Professional Officer	Sana'a, Yemen	May 1997 - December 2007
Christian Pantenius	Senior Field Officer, Programme Coordinator	Addis Ababa, Ethiopia; Cairo, Egypt	July 1997–October 1999, October 1999 - December 2005
Tsedek Abate	International Research & Development Officer	Sana'a, Yemen	July 1998–July 2002
Helena Eriksson	Associated Professional Officer	Khartoum, Sudan	November 2000–January 2003
Hans Wilps	Expert for Applied Research	Cairo, Egypt	February 2001–April 2003
Charles Dewhurst	International Migratory Pest Officer	Khartoum, Sudan	December 2002–February 2004

## 2. CRC present and future

### 2.1 Current activities of CRC

**T**he mandate of CRC is to promote cooperation and coordination of anti-locust activities within the region. It is expected that CRC pays particular attention to capacity development related to survey and control and that it assists national locust programmes with equipment as required.

Furthermore, CRC is tasked with encouraging joint activities and regional programmes, and promoting cooperation and exchange of experience with other regional entities. It should ensure regular locust survey operations and the timely dissemination of locust reports. In addition, and bearing in mind the objectives of the EMPRES/CR Programme, CRC is expected to sustain the preventive Desert Locust management component with coordination activities taken on by the CRC Secretariat.

Various regular activities are being conducted by CRC in order to fulfil the objective of its Establishment Agreement. Accordingly, it supports and strengthens the national Desert Locust control organizations with a focus on the frontline countries that harbour the most important breeding areas and are regularly being confronted with Desert Locust outbreaks.

#### **Coordination**

The CRC Secretariat ensures coordination of various activities through country visits, meetings, tele-conferences, phone calls, e-mails, etc. Personal contacts between the Secretary of CRC and national counterparts are very important to establish a positive working environment and to discuss the common programmes, technical, structural and organizational issues, and to agree on possible solutions and the necessary actions.

The Secretariat organizes a series of meetings. The most important are the regular sessions held once every two years. All member countries and the relevant regional locust organizations are invited to review the locust situation and past actions, and to discuss the future working budget in the light of envisaged activities. An important topic on the agenda is the financial situation and the contributions of the Member Governments to CRC. The Executive Committee meets in between each Commission session to discuss technical and policy matters as well as other special issues that may be raised in the sessions. It also prepares draft programmes of work and budget.



## Human capacity development

Staff training is one of the priority areas of CRC with the aim of qualifying national locust officers to undertake survey and control operations in a professional manner. Special attention is given in all training courses to environmental and human safety measures as well as to proper pesticide management in order to reduce the risks of any negative effects of control on the environment and people.



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Participants at the subregional survey and control training course in Jordan (2012)

CRC provides financial assistance to national training courses conducted by national master trainers. Various subjects of locust management are addressed in subregional training courses for officers from the invasion countries in case they are confronted with incoming locust swarms. New generations of national trainers are qualified in Training-of-Trainers (ToT) courses by regional master trainers. CRC also supports special training on aerial operations for locust survey and control officers and pilots in collaboration with DLCO-EA. In support of the national locust officers, various pocket-sized Standard Operating Procedures (SOPs) have been published in English and Arabic for quick and easy reference for field staff during operations. Additional SOPs on selected topics will be produced to meet the practical needs of the national staff.

CRC is fully aware of the human health and environmental risks associated with the use of chemical pesticides. Since 2012, CRC has conducted workshops on health and environmental safety standards developed by EMPRES/WR. This activity aims at improving the environmental and human safety measures applied during control operations as well as monitoring the impact of chemical control on the environment and human health. So far, seven workshops on the application of these standards have been conducted for the frontline countries.

Since 2001, offshore M.Sc. programmes sponsored by CRC became a recurrent activity. So far, ten students from CRC member countries benefited from this opportunity. Given the importance of enhancing scientific knowledge of locust topics, CRC provides financial support to applied research, for example, on the potential use of locusts for human and animal consumption.

### **Joint activities and programmes**

Joint cross-border surveys between neighbouring frontline countries that share critical breeding areas are important for monitoring the ecological conditions and the locust situation in zones that otherwise could not be properly surveyed. Since 2002, 14 cross-border surveys have been conducted between Saudi Arabia and Yemen, Egypt and Sudan, and Djibouti and Eritrea. Unfortunately, this activity temporarily ceased between 2010 and 2014 because of security reasons. In 2015, CRC succeeded again in organizing one joint survey along the border between Sudan and Eritrea. CRC continues to give high priority to joint cross-border surveys whenever and wherever they can be carried out safely.



Participants at a joint cross-border survey between Saudi Arabia and Yemen (2009)

Given the importance of promoting technical advances and operational improvements, CRC supports regional and interregional workshops on different methodological, environmental and organizational topics. In collaboration with DLIS, interregional workshops on Desert Locust information management, data transmission and new technologies such as eLocust and RAMSES are organized regularly on an annual basis.

The Secretariat gives special attention to emergency preparedness and contingency planning to enhance the ability of the member countries to react more quickly to the onset of a potential locust crisis. This includes making use of the preparedness

assessment tool DeLCoPA, the online emergency management database eLERT developed by the FAO Locust Group, and the Monitoring System of National Locust Control Preparedness developed under the EMPRES Desert Locust Programme in the Western Region. In addition, CRC supports the introduction of the tailor-made Pesticide Inventory Management System initiated by CLCPRO that keeps track of the quality of stored pesticides in order to reduce the risk of accumulating obsolete stocks. A workshop on this topic was held in 2015.

Since 1994, CRC has organized three interregional sprayer testing workshops to periodically evaluate new pesticide application techniques and equipment, and to provide recommendations to the countries and FAO about the most appropriate sprayers for locust control. CRC will continue organizing such workshops on a regular basis also in the future.

### **Advocacy**

CRC gives special attention to raising the visibility and enduring awareness of the Desert Locust problem with policy makers and the international community. Any decline in political attention to plague prevention severely affects the ability of the Commission to provide the necessary support to frontline countries and to countries that have been affected by instability in recent years.

In periods when locusts are apparently not a subject of public concern, member countries and donor agencies tend to pay less attention to prevention. CRC is then confronted with insufficient contributions and irregular settlements of arrears by some of its members and the Commission benefits only occasionally from limited short-term donor support to specific issues. Smarter public relations and better awareness among development partners and member countries are expected to enhance CRC's capacity to render the quality services and assistance needed to maintain and further strengthen national and regional preventive Desert Locust management capacities.

The Commission produces various materials designed to keep the member countries and other interested parties informed of new developments. One of the most important tools is the CRC website ([www.desertlocust-crc.org/](http://www.desertlocust-crc.org/)) which is updated continuously. CRC has distributed several posters and flyers to keep officials informed of its activities and achievements. It routinely organizes the translation into Arabic of the monthly FAO Desert Locust Bulletin, and all updates and alerts issued by DLIS for the benefit of the Arabic-speaking audience.

Jointly with FAO headquarters and CLCPRO, CRC contributes to a number of videos on biopesticides to inform decision makers of the benefits of environmentally safer control technologies. CRC has also succeeded in obtaining extra contributions to its Trust Fund from some of its members and brokered special support from USAID for the rehabilitation of the NLCU in Yemen.

CRC always seeks to increase its limited financial resources to allow the implementation of its ambitious programme. The Commission is planning to make more efforts to raise the awareness of specific topics such as institutional questions related to the autonomy of the NLCUs in some frontline countries, the promotion of biocontrol technology, the establishment of a central reserve stock for biopesticides, regional and national emergency funding, activity evaluation and the durability of early warning systems.

## **2.2 Cooperation with other regional locust organizations**

Originally the Desert Locust recession area was divided for various biogeographical, tactical and political reasons into three regions – western, central and eastern. The western and central regions were subdivided into a northern and southern portion. In the Western Region, the northern part covers the Maghreb countries while the south covers the sub-Saharan countries of West Africa. The northern Central Region encompasses countries from Turkey to northern Ethiopia, including the Near East, while the southern part contains countries in the Horn of Africa and East Africa from South Sudan and Somalia to Tanzania. The Eastern Region includes countries in southwest Asia from Iran to India.

The FAO Commission for Controlling the Desert Locust in the Western Region (Commission de lutte contre le Criquet pèlerin dans la Région Occidentale, CLCPRO) was established in 2002 and today covers most of the member countries of previous regional locust organizations, including the former FAO Commission for Controlling the Desert Locust in North-West Africa (Commission de lutte contre le Criquet pèlerin en Afrique du Nord-ouest, CLCPANO) established in 1971, the Common Organization for the Control of the Desert Locust and Bird Pests (L'Organisation commune de lutte antiacridienne et de lutte antiaviaire, OCLALAV) from 1965 to 1986, and the International African Migratory Locust Organization (Organisation internationale contre le Criquet migrateur africain, OICMA) from 1952 to 1985. The commission in the Eastern Region, the Commission for Controlling the Desert Locust in South-West Asia (SWAC) was the first FAO Desert Locust regional commission and was established in 1964. In the Central Region, the regional organization Desert Locust Control Organization for Eastern Africa (DLCO-EA) started operating in 1962 in the southern portion of the region five years before CRC. Some of its member countries, namely Djibouti, Eritrea, Ethiopia and Sudan, are also members of CRC.

The four regional entities have been established for the same purpose, to protect people's livelihoods from Desert Locust swarms. Though they share a common goal, the mandates of the FAO commissions and DLCO-EA are different. While DLCO-EA intervenes directly with its aircraft for control operations and manages other migratory pests including quelea birds and armyworm, the key function of the commissions is to coordinate and strengthen national Desert Locust management efforts. Naturally, the areas of cooperation and interaction between CRC and the other

FAO commissions and with DLCO-EA are different and have been further stipulated in a Memorandum of Understanding (MoU) of cooperation between CRC and DLCO-EA. The interaction between the four regional bodies is based on an exchange of experience and a sharing of promising tools and approaches developed in one or the other region. The cooperation with SWAC was very instrumental during the early days of CRC while the interaction between CRC and CLCPRO/CLCPANO took somewhat longer to materialise and started to take shape as a result of EMPRES/CR.

### **2.2.1 Interaction with SWAC**

*by Keith Cressman, Secretary SWAC*

**F**AO's oldest regional locust commission, the Commission for Controlling the Desert Locust in South-West Asia (SWAC), was established in 1964 and consists of four member countries that lie to the east of the Central Region. Three of the members, India, Iran and Pakistan, are considered as frontline countries because they have seasonal breeding areas, face Desert Locust populations every year and therefore conduct regular surveys and, when necessary, control operations. Afghanistan, the fourth member, is considered an invasion country and does not undertake regular surveys because it has no seasonal breeding areas and only rarely faces Desert Locust invasions.

Given the geographical proximity of the two commissions, CRC and SWAC actively collaborate in several technical and programmatic areas that strengthen national locust capacities and help countries to manage Desert Locust better and protect important cropping areas. Although the commissions emphasize the importance of regional solidarity as a means of addressing the global Desert Locust threat, this collaboration has taken some 40 years to develop.

#### **Commission sessions**

During the first four decades of CRC, there was limited regular interaction with SWAC, as both commissions seemed to operate independently and in isolation. The first instance of someone from the Central Region participating in a SWAC session occurred at the time of a short-lived plague in the Central Region when the FAO Interregional Locust Officer based in Beirut was an observer at the fifth session of SWAC in 1969. The FAO Regional Plant Protection Specialist working at the FAO Regional Office in Cairo attended SWAC sessions between 1970 and 1972. Thereafter, very little participation took place except for the recently appointed FAO Regional Locust Officer for the Near East, based in Jeddah, who attended the 14<sup>th</sup> session of SWAC in 1980.

Collaboration started to improve in 2002 when the Chairperson of SWAC participated in the 23<sup>rd</sup> CRC session. The session approved the participation of the Chairperson and the Secretary of CRC in SWAC meetings, but it was not until five years later



when, for the first time, the Secretary of CRC attended the 25<sup>th</sup> SWAC session in 2007. Nevertheless, participation by SWAC, either of the Chairperson or the Secretary, in CRC sessions remained irregular until 2010 when the Secretary presented a report on the complementary activities in SWAC. Since then, both Secretaries participate in each other's commission sessions on a regular basis. This has led to better collaboration between the two commissions, resulting in the exchange of experiences and information, sharing common tools such as the Desert Locust Master Trainer Manual kit, and organizing joint activities such as interregional workshops for master trainers, Desert Locust information officers and Locust Heads.

## **Joint surveys**

The two commissions share a common Desert Locust habitat that extends along the Batinah coast in northern Oman and continues across the Arabian Sea to the coastal plains of southeast Iran and southwest Pakistan. Here, Desert Locust usually breed every year during the spring along the sandy coastal plains from about March to May, which coincides with seasonal rainfall. Solitarious adults as well as adult groups and swarms can easily cross back and forth between the northern portion of the Batinah coastal plains in Oman and the Jask-Chabahar plains in southeast Iran.

Consequently, one of the primary and most important means of jointly managing Desert Locust populations between SWAC and CRC is to collaborate in monitoring the common spring breeding areas that are adjacent to both regions in Iran, Oman and the United Arab Emirates. For example, a Pakistani team participated in a special survey carried out in coastal and interior areas of the United Arab Emirates during spring 1978. More recently, Iran and Pakistan have conducted an annual joint survey of their spring breeding areas during April of every year since 1995, which is the main activity of SWAC. In 2011, the Head of the Locust Centre in Oman participated for ten days in the survey along the southeastern coastal plains of Iran from Chabahar to Bandar-e Abbas. This was the first time a locust officer from Oman had joined the survey. The surveys help locust officers in the two countries to become familiar with the habitat and current conditions in the common spring breeding area, and allow the possibility to exchange experiences and expertise. In turn, the joint activity contributes to the global Desert Locust early warning system and strengthens preventive control.

In 2012, the 28<sup>th</sup> session of SWAC recommended that one locust officer from Iran join a national survey in Oman during the spring while an Omani locust officer should continue to participate in the portion of the annual joint survey along the southeast coast of Iran. The funding for this activity should come from the national budgets of the respective countries rather than the commissions. Although an Omani locust officer participated in the joint survey for five days in 2013 and an Iranian locust officer joined a national survey in Oman in 2016, this collaborative arrangement remains elusive and is not fully in place.

## **Information exchange**

Under the auspices of DLIS, member countries of SWAC and CRC regularly exchange locust reports and information between each other and with DLIS. For example, the monthly locust situation bulletins prepared by frontline countries in both commissions are shared with all countries and contribute to FAO's monthly Desert Locust Bulletin issued by DLIS. National Locust Heads or Locust Information Officers in one region often contact their counterpart in the other region concerning the locust situation or ongoing operations, especially during outbreaks when there may be a threat from the adjacent region. Survey and control data are exchanged among some countries within the RAMSES geographic information system used by countries to manage and analyse locust data. In this way, countries in the two regions can share further details concerning the current locust situation.

Reporting, forecasting and information exchange were not always under the auspices of a centralized DLIS. In 1973, early warning and forecasting were decentralized to the three regional locust commissions, including CRC, and to two regional locust control organizations, OCLALAV and DLCO-EA. These organizations missed the 1978 interregional invasion and failed to predict the 1977–1979 upsurge. Consequently, early warning and forecasting were recentralized to FAO headquarters and DLIS was established in 1978. Since then, the three regional commissions have been actively encouraging and assisting their member countries to share high-quality information and data on a regular basis within the global early warning network.

## **Training**

One of the common approaches by CRC and SWAC in strengthening national capacities is to train individuals in member countries who have been designated as master trainers responsible for training locust officers in his or her own country. In this way, a greater number of national staff can receive training on a more regular basis, be retrained more often and, if necessary, in their local language. It is not feasible or cost-effective to organize regional training courses solely for SWAC master trainers because of the low number of member countries in the region. Consequently, CRC and SWAC have collaborated together to organize and conduct several interregional training courses. In 2000, an international course to train master trainers from a dozen countries was organized by EMPRES/CR in Oman. This was one of the first collaborative training events arranged between CRC and SWAC in which there were participants from Eritrea, Ethiopia, India, Iran, Oman, Sudan and Yemen as well as countries from outside the two regions. This was followed by a CRC/SWAC master trainers course in 2002 (Oman) and in 2010 (Iran) for member countries in both commissions.

Similarly, CRC and SWAC have organized annual interregional workshops for Desert Locust information officers in frontline countries of both regions since 2008. These workshops are an opportunity for officers in both regions to exchange experiences,

problems and solutions concerning their work in managing and analysing field data to assess the situation and keep everyone informed. It is also an important occasion for DLIS to train officers in both regions on new tools such as eLocust3 and RAMSESV4 GIS, to introduce the latest versions of the custom applications, and to keep users abreast of the newest technologies and methodologies in early warning.

## **Planning**

Effective early response to locust infestations and their management relies on having well established and tested contingency and action plans in place in frontline and invasion countries before a locust emergency or crisis develops. CRC and SWAC share a common view on contingency planning in Desert Locust management. The concept of contingency planning was first developed and adopted by member countries in CRC under the EMPRES/CR Programme. In 2013, SWAC began to systematically introduce and develop contingency plans in the region, relying on the experience and benefitting from the work that had been done in CRC and CLCPRO. In 2015, CRC organized an interregional workshop for Locust Heads from nine CRC and SWAC countries to discuss the preparation of national contingency plans for responding to locust emergencies and to learn how to use custom tools. The knowledge gained from such workshops is used for developing and refining contingency plans in countries in both regions.

### **2.2.2 Interaction with CLCPRO**

*by Mohamed Lemine, Secretary CLCPRO*

**T**he Commission for Controlling the Desert Locust in the Western Region (CLCPRO) is one of the FAO bodies established under Article XIV of its Constitution, which aims to promote operations and research on the Desert Locust in the Western Region. The region includes West and Northwest Africa, and comprises ten member countries: Algeria, Burkina Faso, Chad, Libya, Mali, Morocco, Mauritania, Niger, Senegal and Tunisia. These countries contain Desert Locust breeding areas that are directly affected by outbreaks in the region, and they also include some countries that are only at risk from locust invasions.

Since its inception, CLCPRO has worked to strengthen cooperation with CRC because both commissions are interconnected in terms of Desert Locust swarm movements. Each of them is affected by what happens, positively or negatively, within the other region.

Consequently, they work continuously together to develop the capacities of their National Locust Control Units in surveying and controlling the Desert Locust. Capacity building of staff to use the technologies needed to improve the implementation of preventive control is also often carried out jointly.

The two commissions together:

- regularly participate in the sessions of the other commission where the attendance of each Secretary allows the programming of joint activities;
- mutually participate in some regional training courses leading to the exchange of expertise and standardisation of concepts;
- organize joint training courses for managers and technicians;
- take advantage of the achievements of each other, for example, the Health and Environmental Standard (Cahier des charges environnementales) produced by CLCPRO for implementing important environmental requirements during Desert Locust operations has been translated into English for use in CRC;
- combine efforts in preparing regional contingency plans and research activities.

All these activities and joint work have contributed to upgrading national Desert Locust capacities with the common objective of sustaining preventive control in both regions. The Commission appreciates the important achievements of CRC and the tremendous efforts undertaken by the Secretariat.



Participants at the interregional contingency planning workshop in Mauritania (2004)

## **2.2.3 Interaction with DLCO-EA**

*by Stephen W. Njoka, Director DLCO-EA*

**T**he Desert Locust Control Organization for Eastern Africa (DLCO-EA) is a regional pest and vector management organization that was established in 1962. Prior to DLCO-EA, the Desert Locust Survey (DLS) and Desert Locust Control (DLC) existed, which were departments of the East African Common Services Organization financed by Kenya, Tanzania and Uganda, as well as the United Kingdom.

The need to establish a regional body to supplement national efforts in locust control and to replace DLS was initiated by FAO in 1961. This led to the establishment of DLCO-EA in 1962 through a convention. The first head office of the Organization was in Dire Dawa, Ethiopia. In 1965, the Council decided to move the DLCO-EA headquarters from Dire Dawa to Asmara where it was allocated a magnificent building in the then palace grounds. The Council meeting in 1971 agreed to the third and final move of the DLCO-EA headquarters from Asmara to Addis Ababa, Ethiopia as it was considered more appropriate and practical for the Organization's headquarters to be in a capital city. The new headquarters in Addis Ababa was officially opened on 15 May 1972.



Calibration of ULV atomizers during a regional aerial control workshop organized by CRC in Nazareth, Ethiopia and conducted in collaboration with DLCO-EA (2009)

DLCO-EA is governed by a Council of Ministers comprising the Ministers of Agriculture/Livestock from its member countries. The Council meets annually, reviews and makes policy, and approves the annual programme of work and budget. The Organization has a total of 110 staff of which 31 are regional professional officers such as researchers, pilots, engineers, information and forecasting officers, accountants



and administrators, while the rest are local support staff. The Council appoints an Executive/Technical Committee and a Director who is the Chief Executive Officer, responsible to the Council for the day-to-day management of the Organization. The Organization comprises the divisions of administration, finance, aerial operation, research and pest information and forecasting. Member countries are Djibouti, Eritrea, Ethiopia, Kenya, Somalia, South Sudan, Sudan, Tanzania and Uganda, covering a land surface area of about 6 157 725 km<sup>2</sup> with an estimated population of 180 million inhabitants.

The Organization maintains its own fleet of fixed-wing aircraft for pest control and crop spraying. It has HF base radios and vehicle-mounted mobile transmitter/receiver sets with approved frequencies for official communication within the region. Pest and weather data are routinely exchanged while aircraft movements and operations are regulated by the national civil aviation authorities in the region. The Organization has its operational air base at Wilson Airport in Nairobi, Kenya.

The Organization also has Country Liaison Offices (Control Reserve Bases) in all of its member countries and enjoys diplomatic privileges and immunities accorded to Specialized Agencies of the United Nations.

### **The Organization's mandate**

Initially, the Organization was mandated to perform control operations against upsurges and plagues of the Desert Locust. Later the mandate was extended to include better management and control of other migratory pests, such as the larvae of the African Armyworm moth, *Spodoptera exempta* (Walker), the grain-eating bird, *Quelea quelea* (Linnaeus) and the Tsetse fly *Glossina spp.* that transmits the deadly parasitic disease, African trypanosomiasis, that affects humans (sleeping sickness) and livestock (Nagana). The Organization is therefore mandated to liaise closely with the National Plant Protection Departments (PPDs) of the Ministries of Agriculture and Livestock Development in its member countries in order to undertake action for the effective management and control of these transboundary pests and disease vectors.

The objectives of DLCO-EA are to:

- provide its services in the coordination and reinforcement of national action against the Desert Locust in the region;
- promote the most effective control and management methods of Desert Locusts in the region;
- concentrate on aerial survey and control of the mandated migratory pests in order to supplement the efforts of the member countries;
- coordinate information flow and forecasting of migratory pest upsurges;
- collaborate closely with PPDs and Control Reserve Bases in the member countries;

- undertake research programmes and activities that mainly address migrant pest control, pesticide use and safety in the region;
- increase its role in staff development in the region;
- assist member countries in the control of armyworm, quelea birds and tsetse flies when the locust situation is calm.

## **Funding**

The Organization largely depends on annual contributions from its member countries. As often happens in such regional organizations, some countries fall into arrears and this usually affects the implementation of planned activities. In order to strengthen the Organization's capacity to sustain operations and to respond to emergencies in the case of pest invasions, the management is encouraged to seek financial support from development partners. During severe locust outbreaks, the Organization liaises with FAO and other international partners for support.

## **Operations**

Since its inception, DLCO-EA has made significant advances in its approach to migrant pests and vector management. The Organization in collaboration with its member countries, FAO and the donor community has successfully suppressed locust plagues in the region that were inflicting heavy losses on crops, pastures and posed a danger to food security. The Organization has also played a major role in controlling tsetse flies in the Busoga region of southeastern Uganda in the 1980s and south of Lake Victoria in the Lambwe Valley of Kenya, in 1981. Such operations have an important impact on human health and livestock development.



Late Captain Arraleh (DLCO-EA) searching for fast-moving Desert Locust swarms in the Konso area of Ethiopia (2008)

DLCO-EA actively participates, at the request of member countries and other organizations, in the control of cotton field pests, black flies and mosquitoes. It also carries out agricultural aerial surveys and provides passenger charter services. Assistance provided elsewhere includes a major operation by DLCO-EA Beaver aircraft to control the Red Locust, *Nomadacris septemfasciata* (Serville), in the outbreak areas of Tanzania, and also in southern Uganda. Indeed, the Organization's aircraft are often used by the International Red Locust Control Organisation for Central and Southern Africa (IRLCO-CSA) and are hired out for control of Red Locusts in Southern Africa.

### Historical operations in non-member countries

The 1972–1973 period witnessed outbreaks of Desert Locusts in the Arabian Peninsula. For the first time, DLCO-EA aircraft were sent to assist Saudi Arabia and the Yemen Arab Republic. This intervention was successful and the situation was brought under control. In 1974, a DLCO-EA Beaver aircraft continued to operate in Saudi Arabia while, at the same time, routine spraying operations took place in the member countries, principally in Sudan, Somalia and Ethiopia. Similarly, a DLCO-EA aircraft under took control operations in Saudi Arabia and the Yemen Arab Republic in 1978.

### Development partners

FAO and DLCO-EA have worked in close collaboration since its establishment to ensure the strengthening of national, regional and subregional capacity building in the fight against locusts. Consequently, DLCO-EA has received various technical, financial and other forms of support from FAO and its EMPRES/CR Programme. Furthermore, consecutive meetings on harmonizing the collaboration of the two regional bodies, CRC and DLCO-EA, have been organized under the umbrella of EMPRES/CR in 2001 and 2002. The aim was to develop a common approach to preventive locust control strategies. In this regard, a Memorandum of Understanding (MoU) on cooperation between CRC and DLCO-EA was signed and approved by the DLCO-EA Council of Ministers in 2004. This ensures that the resources of both bodies are used to a maximum effect in order to sustain preventive Desert Locust management and to avoid duplication of efforts.

There has been good cooperation between FAO, CRC-EMPRES/CR and DLCO-EA in a number of different areas, for example:

- DLCO-EA received five AgDGPS track guidance systems for its spray aircraft from EMPRES/CR to ensure more precise aerial pesticide application;
- Regional aerial survey and control training programmes were jointly carried out for participants from the Central Region as well as participants from other regions;
- DLCO-EA participated in annual interregional workshops and training on data and information management, eLocust and RAMSES programs that were organized by CRC and DLIS;

- DLCO-EA has received from EMPRES/CR the RAMSES GIS, vehicles, several HF radio sets, survey equipment and training kits;
- With financial assistance of EMPRES/CR and CRC, DLCO-EA was able to carry out field evaluation of the entomopathogenic fungus *Metarhizium anisopliae* var. *acridum*, against Desert Locust hoppers in eastern Ethiopia and northwest Somalia;
- DLCO-EA cooperated with EMPRES/CR and CRC in training and demonstrating the use and handling of the biocontrol product, Green Muscle™, by locust officers in the Central Region;
- DLCO-EA actively and regularly participates in DLCC meetings;
- DLCO-EA management or information officers have participated regularly in annual EMPRES/CR meetings and workshops;
- Since 1973, DLCO-EA has attended CRC sessions as an observer and the CRC Secretary often attends DLCO-EA Ministerial meetings;
- In 2012, FAO and DLCO-EA signed an agreement for the establishment of a community-based Desert Locust monitoring and reporting system in the Horn of Africa, funded by USAID, and to promote environmentally safer control technologies.

## **2.3 Future challenges for CRC**

**E**stablishing a specific FAO commission for the fight against the Desert Locust in the Central Region was an important prerequisite in the effort to assist the affected states in building and gradually improving their national structures and capacities to manage Desert Locust populations more effectively. But creating a regional organization is only the first step, maintaining a corporate institution and filling it with energy and life to the benefit of its stakeholders is a different act of defiance. CRC has passed through many difficult periods during its first 50 years of its existence. But despite a variety of managerial and financial constraints, CRC has been able to grow over time to provide increasingly more and better services to its member countries.

In general, the agreed global locust management strategy is based on prevention and the ability of the national locust organizations to contain early signs of possible locust upsurges and plagues as quickly as possible. Thus, CRC as coordinating body in the region has a very important role to play within this strategy.

It continuously promotes economic and environmentally safer locust management approaches that rely heavily on the adoption of technical advances. Reduced investment in these technologies and tactics, and reluctant support by some Member Governments to their National Locust Control Units (NLCU) and the Commission remain issues of major concern in ensuring the delivery of services by CRC. Without that investment and support, it is difficult to maintain vigilance and sustain regular monitoring of

potential outbreak areas particularly during recession periods. Moreover, the absence of autonomous NLCUs in most of the frontline countries makes appropriate and swift reaction to possibly dangerous locust developments much harder. It is for these reasons, the CRC Secretariat continues to encourage member countries to provide the desired support to their NLCUs and to facilitate technical and procedural advances.



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Participants at the interregional contingency planning workshop in Hurghada, Egypt on 15–19 February 2015

The member countries are undoubtedly aware of the challenges. This was confirmed at the 29<sup>th</sup> session held in Dubai, United Arab Emirates where delegates endorsed an increase of contributions to CRC that will enable the Commission to further fulfil its mandate in providing the expected tools, services and support particularly required by those member countries that stand in the frontline and face the most acute needs.

The approval of establishing a Desert Locust regional emergency fund under CRC was a wise decision and an important step towards achieving greater self-reliance. It is hoped that this fund will be seen as a sign of the Member Governments' commitment and encourages the international community to sustain its support for improved preventive control tactics in the region. In addition, the aspect of continuous national and regional contingency planning and organizing rapid emergency support are critical. Regional cooperation and solidarity has allowed for some of the constraints to be overcome and should be further enhanced to maintain the welfare of the people living in the region.

Being aware that locust upsurges or plagues can quickly develop at any moment, the major concern of CRC is to continuously motivate the Member Governments not only to maintain but also to strengthen national and regional Desert Locust management capacities further to face new and upcoming risks.



Climate change will certainly have an impact on the occurrence and movements of gregarious Desert Locust populations. The importance of preserving biodiversity as much as possible while carrying out extensive chemical control of locust infestations needs to be addressed more decisively, by using only biopesticides in ecologically sensitive areas.

Satisfying the needs for food of a growing population remains high on the agenda. But with the problem of being confronted with increasing social and political instability, even more vigilance and attention are likely to be required to face one of the world's most dangerous insect pests during the next 50 years.

Being aware of the difficult tasks ahead, it is clear that CRC on its own cannot shoulder all the challenges. It relies first and foremost on the relentless commitment of its member countries and on enhanced interregional cooperation with its sister organizations in the Western and Eastern Regions and with DLCO-EA. Everybody shares the same principles and values, and faces similar constraints. CRC will strive to stimulate and encourage joint activities and projects of mutual interest and concern. It continues to emphasize the training of national locust officers in all aspects of current and future survey and control technologies, and will place increased attention on raising the training skills and capacities of national trainers.

CRC remains committed in stressing the importance of improved early warning and monitoring systems and rapid reaction capacities by continuously updating operational risk management capacities at the regional and national levels. CRC will also pursue the technical and legal aspects that hamper the introduction of environmentally safer control options. By taking note that a chain is only as strong as its weakest link, CRC will vigorously do everything possible to enhance intraregional cooperation and solidarity between Member Governments.

At the CRC sessions held every two years, the achievements, objectives and programmes for the next period and the working budgets are discussed, reflecting common goals and individual needs. To satisfy the needs and to address the challenges ahead, more appropriate priority setting, quality management and monitoring of services rendered by CRC are needed. It is only through utmost transparency, it can be expected that all stakeholders and partners remain committed to their agreed obligations, the common values and effectively contribute to safeguarding food security in the areas affected by the Desert Locust and beyond.

### 3. The Desert Locust problem



An almost fully gregarious Desert Locust adult

**T**he Desert Locust, *Schistocerca gregaria*, belongs to the short-horned grasshopper family Acrididae, which includes more than 300 locust and grasshopper species that are known to exist in Africa and the Near East. But locusts differ distinctly from normal grasshoppers because of their ability to change their behaviour and physiology in response to their environment and can form highly mobile swarms.

Among the best known locust species in Africa are: Tree Locusts (*Anacridium melanorhodon* and *A. wernerellum*), the African Migratory Locust (*Locusta migratoria migratorioides*), the Red Locust (*Nomadacris septemfasciata*), the Brown Locust (*Locustana pardalina*), the Madagascar Migratory Locust (*Locusta migratoria capito*), and the Desert Locust.

Of these, the Desert Locust is considered to be the most mobile species and the most devastating. An adult Desert Locust can consume 2–3 g of green vegetation per day, which is about its own body weight. Bearing in mind that one square kilometre of a medium-density swarm can contain up to 50 million insects, devouring about 100 tonnes of vegetation per day, and as swarms can sometimes be many km<sup>2</sup> in size, the destruction that the Desert Locust can cause is potentially devastating.

### 3.1 Desert Locust biology and behaviour

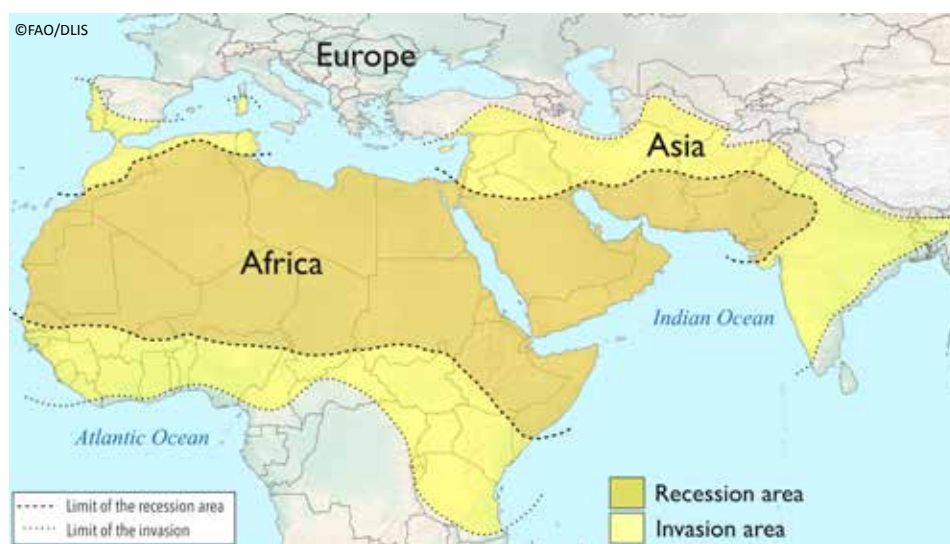
*“The name of the Desert Locust is most appropriate, it exists in the desert,  
but it is most closely dependent on water.”*

(B.P. Uvarov, 1957)

**W**hen locusts occur in small numbers, they live in isolation like ordinary grasshoppers and cause no damage to crops. But when they increase in number and their population becomes more concentrated, they change their behaviour and colour, start grouping and form bands and swarms of up to 500 km<sup>2</sup> in size.

In his paper on phase theory in 1921, B.P. Uvarov first described that what was considered to be two different insects were only different shapes of the same species. He called the grasshopper form the “*solitarious*” phase and, when the locusts increase in number and cluster into dense groups, bands or swarms, he called them the “*gregarious*” phase, with “*transiens*” phases in between when locusts are in the process of changing from solitarious to the gregarious and vice versa.

Because locust plagues happen only periodically, for centuries it was a mystery as to where the locust swarms vanished during calm years, known as a “*recession period*” and from where they suddenly emerged as swarms during a “*plague period*”. It was only with Uvarov’s phase theory that the apparent disappearance and sudden resurgence of locust swarms could be explained.



Potential Desert Locust recession and invasion areas

## Distribution

The Desert Locust normally occurs in an area of about 16 million km<sup>2</sup> that extends from the Atlantic Ocean in West Africa, across the Sahel, through the Arabian Peninsula to northwest India. This is called the “*recession area*”. During plague periods, the area invaded by Desert Locust swarms can nearly double in size and reach some 29 million km<sup>2</sup>, which represents about 20 percent of the earth’s land surface. The so-called “*invasion area*” can stretch as far south as Tanzania, as far north as Turkey and as far east as Bangladesh. In October 1988, locust swarms even crossed the Atlantic Ocean and reached the Caribbean islands.

## Lifecycle

During her lifespan of about three months, a solitary adult female usually lays batches of 3–4 egg pods at 6–11 day intervals. Each egg pod contains 90–160 eggs. By contrast, a gregarious female produces up to three pods of only 60–80 eggs each. The female locust lays her egg pods in sandy soil that contain sufficient moisture

for the eggs to complete their development. Gregarious females lay their egg pods in dense groups with tens and even hundreds of pods in one square metre. They choose sites next to suitable natural vegetation such as *Panicum sp.* or *Heliotropium sp.* The egg pods, of 3–4 cm in length, are usually laid 5–10 cm under the soil surface. In optimal conditions of 19–35 °C, the eggs hatch within about two weeks. Because of high levels of mortality, not all eggs develop into nymphs or wingless hoppers.



Solitary hoppers are mainly greenish in colour and pass through five to six instar stages or moults in about 36 days to become young adults. Gregarious hoppers are black at first, and later become yellow and black. They develop through five instar stages in about 25 days.

While solitary nymphs quickly disperse, gregarious hoppers become concentrated and form groups and eventually even large bands of hundreds of hoppers per square metre. Once the hopper fledges, it takes about ten days for the wings and body of the fledgling to harden in order for the immature adult to fly.



Gregarious Desert Locust hopper (left) and solitary hopper (right)

In optimal conditions of warm temperatures and green vegetation, it takes the young adult at least three weeks to become sexually mature and ready to copulate and lay eggs. The number of generations per year varies, depending on whether the locusts find the right conditions for breeding. It is estimated that a single female can produce 16–20 viable progeny in a single generation.

### Behaviour and ecology

The Desert Locust is very sensitive to changes in locust population densities. Increased tactile stimulation, particularly of their hind legs, prompts hormonal responses that signal the availability of food, and initiate gregarization and behavioural phase transformation. As a result, locust populations during recessions can be heterogeneous, consisting of solitary and *transiens* individuals; whereas during a plague, populations are more homogeneous and contain gregarious locusts.



Mature almost fully gregarious adult (left) and solitary adult (right)

Solitary adults can be distinguished from gregarious adults by their mainly greyish-brown colour and are difficult to detect as their colours blend perfectly with their surroundings. Gregarious adults are rosy-pink when immature, darkening with



age to brownish-red, and eventually become bright yellow when fully mature. If locust numbers decline, gregarious locusts can transform back to the solitary type.

Solitary adults usually live on their own, flying at night for only few hours over short distances. Once gregarious, immature adults form highly mobile swarms that consume large quantities of green vegetation and can fly over long distances. Swarms take off from their overnight roosting places by mid-morning after basking in the sun to warm up their bodies to sustain flight.

They migrate downwind over distances of typically 100–200 km per day. The total distance travelled can amount to 2 000 or 3 000 km in a month. The distance that swarms can fly is highly variable and depends on the speed of the wind as well as available food. Swarms flying over green vegetation will frequently settle and feed. When crossing areas with little or no vegetation, they will stay airborne and can fly much longer distances. Swarms usually settle back on the ground an hour or so before sunset once convective winds decline.

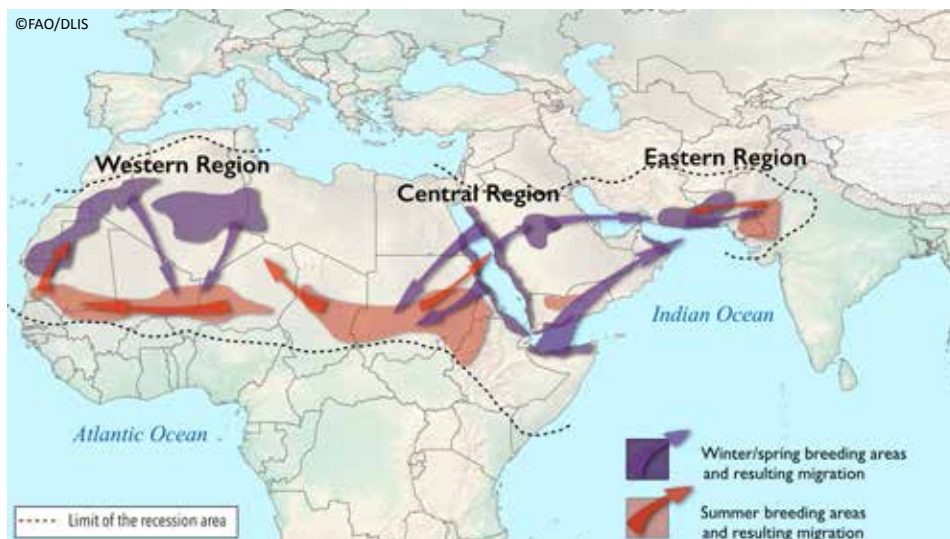


An egg-laying *transiens* Desert Locust female

As swarms travel downwind, they eventually arrive in places where monsoon air and trade winds meet, the so-called Inter-Tropical Convergence Zone (ITCZ) where widespread rainfall is most likely to occur. This is essential to the survival of the Desert Locust because it can only breed successfully in areas where there is moist sandy soil in which eggs can develop and suitable fresh vegetation is available to provide food and shelter for the young hoppers. If rainfall is too little, heavy mortality can occur within the population and the swarms and bands disintegrate. The individual locusts that survive revert to *transiens* and eventually to solitary phases again.

## Seasonal migration and breeding areas

Both solitary and gregarious adults move between widely separated seasonal breeding areas. During the spring, breeding areas are located in Northwest Africa, the interior of the Arabian Peninsula, and coastal areas of northern Oman, southeast Iran and southwest Pakistan. Once areas dry out and no longer provide enough food or suitable breeding sites, spring-bred adults leave Northwest Africa and move southwards across the Sahara Desert to the ITCZ where the summer rains occur.



Desert Locust movements between seasonal breeding areas

The summer breeding belt stretches all along the northern Sahelian zone from Mauritania to Eritrea, as well as further east, in the interior of Yemen and along the Indo-Pakistan border area. The much smaller winter breeding area covers both sides of the Red Sea and the Gulf of Aden. In contrast to plague populations, recession populations occur in the central, drier parts of the distribution area where the average annual rainfall is less than 200 mm.

Season	Rainfall period	Area
Spring	February–May (long rains)	Interior of Saudi Arabia, Yemen and Somalia
Summer	June/July–September/ October	Sudan, Somalia, Eritrea, Ethiopia
Winter	October–January (short rains)	Red Sea and Gulf of Aden coasts and Somalia

Desert Locust breeding seasons, rainfall periods and areas in the Central Region

In the Central Region, the spatiotemporal distribution of locust breeding is characterized by the extraordinary geo-ecological landscape. The eastern African and western Arabian highlands and their coastal plains separated by the Red Sea, the Gulf of Aden, and the East African Rift Valley determine the seasonal rainfall patterns.

In the northern part of the Central Region, rainfall and breeding can take place during summer, winter and spring seasons. The summer breeding zone is an extension of the summer breeding belt in the Western Region and stretches through Sudan to western Eritrea. Swarms produced on the summer rains in Sudan migrate in autumn towards the northeast and east to the winter breeding belt along both sides of the Red Sea. Winter breeding occurs mainly in the Red Sea coastal areas of southeast Egypt, Sudan, Eritrea, Saudi Arabia and Yemen and, to a lesser extent, on the Gulf of Aden coast in Yemen and northern Somalia. Breeding can also occur in subcoastal areas of northeast Sudan and southeast Egypt.



The potential breeding areas of the Desert Locust in the Central Region during the spring (left), summer (middle) and winter (right) seasons

The Red Sea coastal plains are particularly suitable for locust breeding because of their relatively stable habitats with comparatively favourable rainfall regimes, high temperatures and humidity and the abundant annual vegetation such as *Heliotropium sp.* and *Tribulus sp.* Adults produced in the coastal areas move northeast towards the spring breeding areas in the interior of Saudi Arabia. Once temperatures are warm enough and rains fall, breeding can occur in the interior of Saudi Arabia and Yemen usually between March and June. The bulk of spring-bred swarms fly southwest to the interior of Sudan and western Eritrea where they meet the summer rains.

During upsurges and plagues, some swarms from the spring breeding areas of Saudi Arabia can fly east through Iran to reach the Indo-Pakistan summer breeding areas while those in the interior of Yemen first fly south to the Gulf of Aden and then migrate on the southwest monsoon winds to reach India in early summer, or south to the Horn of Africa in late summer or early autumn.

In the southern part of the Central Region, the seasonal patterns of breeding and migration are more complex and erratic because of the irregular northeast monsoon and southeasterly trade winds, both bringing rains at different seasons in different parts of the region. Potentially, three breeding seasons can occur in Ethiopia and Eritrea. Further south in Somalia, Ethiopia and Kenya there are two main breeding seasons: (a) during the short rains between October and February when breeding occurs in the vast lowland belt stretching from northern Somalia and southeastern Ethiopia to eastern Kenya, and (b) the long rains from March to June in basically the same areas as the previous generation. Swarms emerging from Somalia can cross the Arabian Sea

to reach India and Pakistan in early summer. Because of the overlap between seasonal rainfall regimes around the Red Sea and in the Arabian Peninsula, locust breeding in the Central Region can continue with scarcely any interruption, leading to a rapid production of several successive *transiens*/gregarious locust generations.

### **Outbreaks, upsurges and plagues**

In most years during recession periods, the Desert Locust occurs in low numbers as solitary individuals in semi-arid or arid areas far away from major agricultural zones. In this dry desert and semi-desert recession area, the Desert Locust can survive in such a demanding environment by migrating when necessary to search for sufficient moisture and green pasture. Consequently, solitary locusts are found more often in areas where some rainfall has occurred or where runoff from hills and escarpments into dry river beds, or wadis, provide more favourable habitats.



Infestation of groups of hoppers and immature adult Desert Locusts

The beginning of an outbreak is often marked by unusual rainfall in a relatively small geographically restricted area that produces ideal vegetation and good ecological conditions for breeding. But the vegetation may be short-lived and once it starts to dry out, the hoppers concentrate in the patches that remain green. Through repeated encounters with each other, the increased tactile stimulation between the hoppers triggers the gregarization process. The hoppers start forming small basking groups, then small marching groups, which later become larger. If there are sufficiently large numbers of hoppers, the marching groups merge with others and form small bands. This process can be exacerbated by adults that may arrive into the same areas that remain green. As the adults concentrate, they become more gregarious and can form groups and small swarms.



Once the vegetation has dried out, the adults leave the original habitat and migrate to other breeding areas that have received sufficient rains. For the national locust control units, it represents a particular challenge to detect such hot spots early enough and to control the gregarious infestations in order to break the gregarization cycle before an upsurge can develop.

While locally restricted outbreaks occur relatively frequently within the seasonal breeding areas, upsurges that affect several countries or a region are comparatively rare events. In most seasons, the initially low-density populations do not achieve the multiplication rates needed to produce a major upsurge. Widespread and repeated rainfall in several parts of the recession area within the region are thus required for the development of an upsurge.



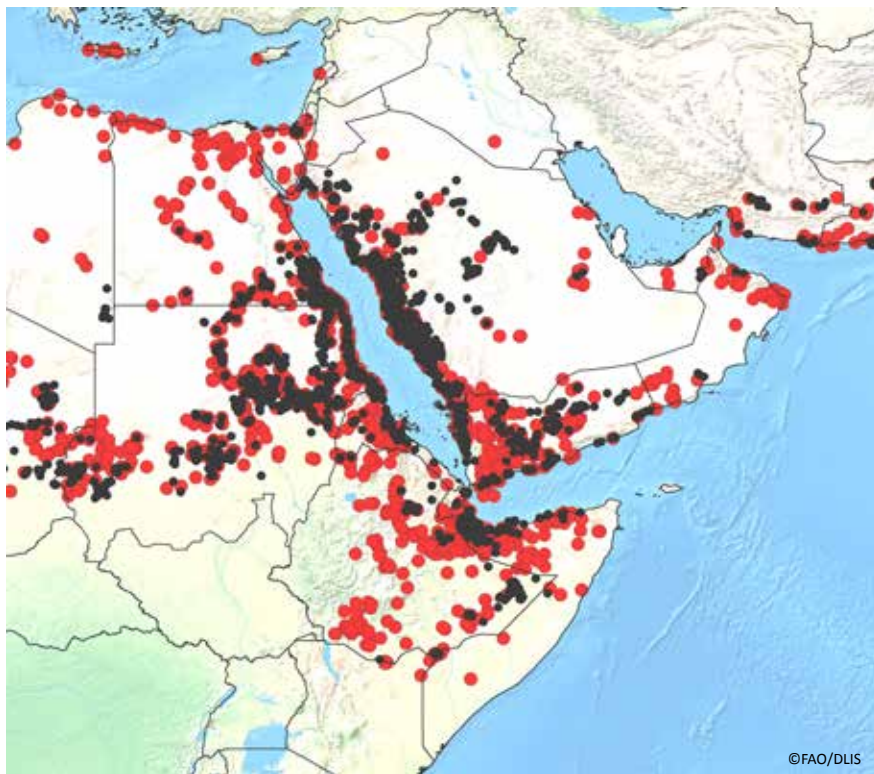
A Desert Locust swarm

This allows successful breeding and gregarization over several generations and a significant increase in the numbers, size and coherence of hopper bands and swarms. Once the vegetation in the outbreak area dries out, the gregarious adult swarms move out to complementary seasonal breeding grounds. For example, locusts from the winter breeding area of the Red Sea coast move inland to the spring breeding belt of Saudi Arabia. During upsurges, such movements are often confined to one region but may affect several countries.

The distinction between an upsurge and a plague is not always clear or easy. In general, the characteristics of Desert Locust plagues are similar to those of upsurges, but in a plague, swarm movements from one breeding area to another affect more than one region.



Plague swarms are usually observed for several years and occupy larger areas than upsurges. Since the late nineteenth century when the Desert Locust phenomenon began to be investigated and observations were made systematically, Northwest Africa, East Africa, the Near East and Southwest Asia encountered eleven major upsurges and nine plagues. Nearly all of these affected the Central Region.



Recorded gregarious hopper bands (black dots) and adult Desert Locust swarms (red dots) in the Central Region between 1990 and 2015

### **3.2 Upsurges and plagues in the Central Region**

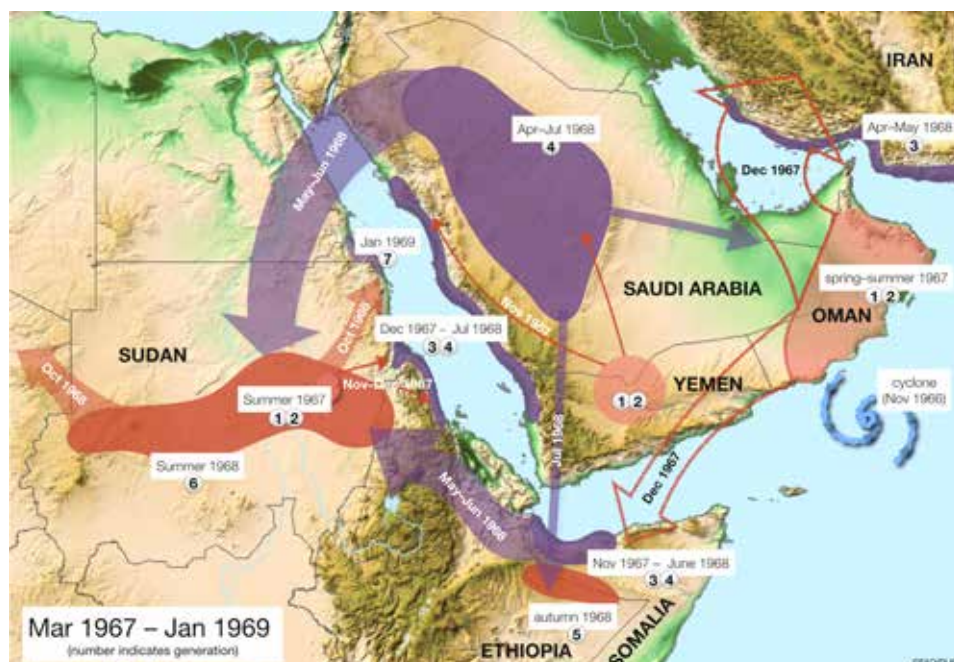
**T**his review is an attempt to provide a brief summary of the fluctuations in Desert Locust populations within the Central Region starting from the inception of CRC in 1967. It is not intended to be a detailed account of all the geobiological, ecological and organizational aspects related to particular upsurges or plagues. It describes what happened in the context of locust movements and how they affected neighbouring regions. As most of the recent Desert Locust upsurges and plagues originated from the Central Region, preventing such dangerous developments must be a priority in this region. In fact, six out of the seven upsurges and two of the three plagues during the past 50 years were initiated in the Central Region.

Upsurges	Plagues
1967–1968	1968–1969
1972–1974	
1977–1979	
1985	1986–1989
1992–1994	
1994–1996	
1996–1998	
2004–2005	

Desert Locust upsurges and plagues in the Central Region since 1967

## The 1967–1969 upsurge and plague

A short-lived plague developed as a result of a cyclone in late 1966 and rains in the winter and spring that caused simultaneous outbreaks in the Western and Central Regions. The plague spread during the summer of 1968 to all three regions but had ended by the following spring due to a combination of control, poor rains and migrations to unfavourable areas.



Exceptionally heavy rains fell in southern Arabia during the spring of 1967 in some of the same areas that had been affected by a cyclone in November 1966. Two generations of breeding are thought to have occurred that gave rise to very large numbers of locusts by autumn in the southwestern interior of the Arabian Peninsula but with little or no

gregarization. Successful breeding resulted in a steady increase of locust populations. A second large population was present in southeastern Arabia where swarms formed and migrated to Iran, the southern coast of Yemen and the Horn of Africa in December 1967. Adults from undetected summer breeding in the interior of Sudan moved to the Red Sea coastal plains in early autumn while others bred in small cultivations totalling about 50 km<sup>2</sup> in northern and eastern Sudan.

During the winter of 1967–1968, following abundant rains and two successful generations of breeding along both sides of the Red Sea and Gulf of Aden, there was a rapid increase in locust numbers and an upsurge developed in the region. Swarms formed and large-scale control campaigns were mounted in Sudan and Ethiopia that had eliminated most of the swarms by April 1968. A similar campaign on the coastal plains of northwest Somalia where breeding occurred in an area of about 4 000 km<sup>2</sup> was less successful as movement by control teams was restricted by the dense, luxuriant vegetation.



Barrier spraying with an exhaust nozzle sprayer in Ethiopia

In May, at least 20 small swarms started to migrate from this area with most of them moving northwest to the Danakil Depression and northern highlands of Ethiopia, and a few swarms reaching eastern Sudan. A small number of swarms remained in the railway area of Ethiopia and moved east towards northeast Somalia. In June and July, swarms and bands produced by local breeding were present in northeast Somalia. In northern Ethiopia, breeding continued during August and many young swarms were detected on the Red Sea coastal plains of northern Ethiopia.

On the eastern side of the Red Sea, important infestations were found progressively further north in the winter breeding areas along the northern Tihama of Saudi Arabia from January to March 1968. In March, large numbers of locusts from the Tihama

coastal plains invaded the interior of Saudi Arabia where breeding conditions were favourable in an area of about 30 000 km<sup>2</sup>. Heavy rains fell during April in all of central and northern Saudi Arabia, allowing breeding to take place on a considerable scale in an estimated area of 100 000 km<sup>2</sup> and swarms formed by early summer.

In late May and early June, swarms left the coastal and interior areas and crossed the Red Sea to Egypt and the summer breeding areas of Sudan as far as Darfur. Other swarms from the Arabian interior migrated south in June and invaded the Horn of Africa. A few swarms moved northwards, reaching southern Jordan and areas near the Iraqi border and eastwards to southeast United Arab Emirates and the interior of northern Oman. Summer rains were above average in the infested parts of Sudan and northern Ethiopia where widespread breeding took place in July and August 1968.

A successful aerial campaign was conducted against hopper bands that formed in northern Ethiopia. Control operations were less successful in Sudan where the chief method of control was baiting, which was an inappropriate method to control some 11 000 km<sup>2</sup> infested with hopper bands. Consequently, many swarms formed in this area and migrated to Northwest Africa and the Red Sea coast during the autumn. The latter arrived on the coastal plains near the Egyptian-Sudanese and Sudanese-Ethiopian borders where one generation of breeding occurred that was successfully controlled assisted by natural mortality in January 1969. The swarms from the Arabian interior that invaded the Horn of Africa in the summer of 1968 concentrated mainly along the Ethiopian-Somali border. Successful breeding during the autumn caused new swarms to form in January 1969. The swarms that escaped control operations moved northwest to the Ethiopian highlands where they died without breeding, leading to the collapse of the plague in the region.

In the Near East, control operations were carried out in Jordan, Saudi Arabia, Sudan, United Arab Emirates, PDR Yemen and the Arab Republic of Yemen. The total area treated in these countries was approximately 356 300 km<sup>2</sup>. In Eastern Africa, the total area treated was 10 382 km<sup>2</sup>.

### **The 1972–1974 upsurge**

An upsurge or at least a series of major outbreaks occurred in the interior of the Arabian Peninsula and along the Red Sea coast from October 1972 to May 1973. Irregular control operations were undertaken between December 1972 and spring 1974.

Detailed accounts are missing as the centralized DLIS services ceased in July 1973 and its duties were assumed by the three FAO regional locust commissions, OCLALAV and DLCO-EA that often provided incomplete and confusing information and warnings.

Breeding during the summer of 1972 led to gregarization in several remote areas of southern Arabia. In June, adult groups and small swarms were present in Oman. In August, hopper groups were reported on the Red Sea coast near Qunfidah, Saudi



Arabia and inland southeast of Najran, and marching bands and adult groups were present in PDR Yemen. In September, swarms appeared in Oman and the interior of PDR Yemen. Some of these swarms are thought to have moved to the Red Sea coast and displaced northwards. In late October and again in late November, a cyclone brought widespread heavy rains to the northern Somali coast, Djibouti and the Aden coastal plains in PDR Yemen. The effect of the cyclones not only improved ecological conditions in many key breeding areas but also concentrated solitarious adults in these areas. This triggered a rapid buildup in locust populations and numerous gregarious hopper bands, fledglings and mature adults were observed in Saudi Arabia, Oman, PDR Yemen, the Yemen Arab Republic and in the Tokar Delta, Sudan by the end of 1972.



Fortunately, the good early winter rains did not continue into the spring and vegetation dried out along the coastal plains of the Red Sea and Gulf of Aden, forcing locusts to concentrate and form hopper bands and swarms. Timely ground and aerial control operations were carried out against the infestations in early 1973. An aircraft from Sudan and one from DLCO-EA undertook control operations in Sudan and Saudi Arabia. DLCO-EA aircraft also carried out control operations in PDR Yemen, Djibouti and northern Somalia. The result of extensive collaboration combined with poor rainfall is likely to have prevented the onset of another Desert Locust plague.

Nevertheless, some infestations persisted in these areas. Desert Locust adult groups and several mature swarms were reported on the Tihama as far as Qunfidah, Saudi Arabia in December 1973 and early January 1974. Saudi Arabia responded with ground control operations. In February, there were further reports of small swarms of



about 4 km<sup>2</sup> from the same area. At the same time, a large number of hopper bands of various sizes were present throughout the area. In order to cope with the situation, an aircraft was again mobilized from DLCO-EA to complement the ground control operations. The assistance from DLCO-EA helped to control the infestation in Saudi Arabia by March 1974.



But the subsequent summer breeding conditions continued to be favourable in southwestern Arabia and another control campaign was mounted against hopper bands and adult groups between July and September. In the autumn, swarms and groups reached the Saudi Tihama and bred. On the western Red Sea coasts of Sudan and Ethiopia, extensive aerial and ground control were mounted against similar spring populations in 1974. An immature swarm reached northeastern Ethiopia in July and groups of hoppers and adults were seen in Djibouti. Scattered adults moved to the interior of Sudan, but breeding was not observed until September when groups of mature adults occurred in Kassala and were controlled. In October, bands and immature groups appeared in Sudan between the Nile Valley and the Ethiopian border that probably arose from summer-bred populations. In November, swarms and groups invaded the coastal plains along the western side of the Red Sea and laid eggs. Good rainfall on the northern Tihama coastal plains in Saudi Arabia during October and November caused an increase in locust numbers. Immature and mature swarms were reported between Mastura and Rabigh. The mature swarms laid eggs, which resulted in numerous hopper bands in December 1974. As a result of successful control measures undertaken by the locust control teams in these areas, very few locusts were observed during the summer breeding season in 1975.

## The 1977–1979 upsurge

The upsurge was initiated by unusually heavy rains that allowed breeding and population buildup in early 1977, followed by a June cyclone in Oman and a weak October cyclone over the Horn of Africa that gave rise to two generations of breeding before the end of the year. Large numbers of hopper band and swarms formed, and the situation was nearly a plague by summer 1978 when swarms migrated to the Eastern Region. An intensive control campaign brought the situation under control by March 1979.



Since the termination of the last upsurge in 1974, Desert Locust numbers were consistently declining and had reached very low levels in the Central Region. However, numbers started to increase again in early 1977 as a result of breeding that followed unusually heavy rains along the Red Sea coast in Sudan and Ethiopia in November 1976. Control operations commenced shortly after the new year against hoppers and adults that were forming groups in both countries.

In February, control operations were mounted on the Tihama in the Yemen Arab Republic where small-scale breeding had been in progress since October. Limited breeding occurred on the Red Sea coast in Saudi Arabia and scattered adults were present in northern Somalia. In the United Arab Emirates, adults that probably arrived from the Indo-Pakistan summer breeding areas during the previous autumn bred in areas that received widespread rains in late December and early January 1977.

Control operations commenced in April against hopper concentrations, and adults formed groups during May. In mid-June, a cyclone struck northeast Oman bringing heavy rains. Masirah Island recorded 431 mm of rain in a 24-hour period, which is thought to be the heaviest amount of rain ever recorded in eastern Arabia. Adults that escaped detection and control in the United Arab Emirates were probably caught in winds associated with a cyclone and were carried to the rain-affected areas where nearly two generations of breeding took place between June and November during which gregarization occurred.

Widespread heavy rains fell over large parts of eastern Africa and the Arabian Peninsula, including the Red Sea and Gulf of Aden coastal plains, during the second half of October 1977. Port Sudan, for example, received 64 mm in October, the highest total ever reported for that month as it normally receives about 6 mm. A weak cyclone on 21 October brought heavy rains to Somalia, Ethiopia and southern Arabia. Hargeisa received 250 mm compared with the long-term average of 16 mm for October. More heavy rain fell during November over southern Arabia and the Somali peninsula. Consequently, ecological conditions became exceptionally favourable for breeding in all of these areas and remained so far at least six months.

During October and November, swarms from northeast Oman invaded southwest Arabia, northern Somalia and the southern Red Sea coast in Ethiopia. Swarms were reported on the Red Sea coast in Saudi Arabia and the Yemen Arab Republic in December and January, respectively. In addition, adults from the summer breeding areas of the interior in Sudan moved to the winter breeding areas along the coast in Red Sea coast in Sudan and northern Ethiopia. Two additional generations of breeding occurred in rapid succession along both sides of the Red Sea as well as in northern Somalia where a partial third generation took place.

Ground control operations were launched in Sudan in November, supplemented by aerial operation in January 1978. In February, a DLCO-EA aircraft joined ongoing control operations in Saudi Arabia and then shifted to the Yemen Arab Republic in March. Ground operations started in northern Somalia and PDR Yemen during the same month, and aerial control was undertaken in northern Somalia during March. However, survey and control operations were hampered in several countries by further rains that lasted until March. Consequently, large numbers of hopper bands and swarms formed. In late May, some 50 swarms were reported in Ethiopia and aerial control operations were in progress while 17 swarms were seen in northern Somalia. Swarms along the Red Sea coast in Saudi Arabia and the Yemen Arab Republic migrated to spring breeding areas in the remote interior of both countries where one generation of breeding took place until June. Widespread breeding also occurred in PDR Yemen from March to September.

In the summer of 1978, the Desert Locust situation was on the verge of a plague. In early June, swarms migrated from the Horn of Africa and the Arabian interior to India, reaching the Rann of Kutch where they subsequently moved to summer breeding

areas in Rajasthan and adjacent areas of Pakistan. Although substantial mortality apparently resulted along the way, two generations of breeding occurred along both sides of the Indo-Pakistan border as a result of good monsoon rains. Swarms moved from the winter breeding areas along the coast to northern interior of Ethiopia while only adults were reported in the interior of Sudan where widespread, heavy rains fell in July followed by one generation of breeding that led to the formation of swarms in mid-September.



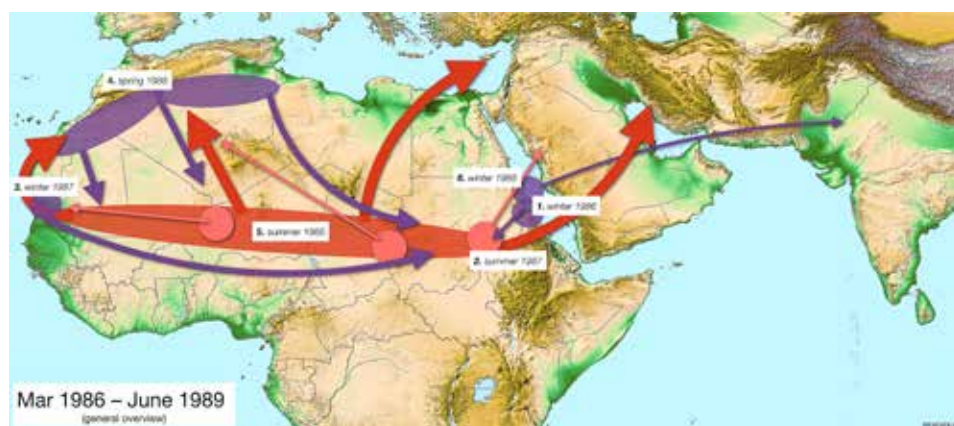
Ground control operations started in Ethiopia in July followed by aerial control in August. While some of the adults moved back to the Red Sea coast of Sudan and Saudi Arabia, most of them remained in the interior for another generation of breeding before moving to the winter breeding areas. In the Horn of Africa, swarms bred on the Somali plateau and moved to the Ogaden in eastern Ethiopia during October. During the winter and spring 1978–1979, summer-bred swarms from Sudan and Ethiopia arrived along both sides of the Red Sea in November and laid eggs. Hopper groups and bands formed from December onwards.

An intensive campaign brought the situation under control by March 1979 along both sides of the Red Sea and in the Horn of Africa. After two upsurges and nearly a plague in less than ten years, it became apparent that the five regional information units could not manage the increased workload associated with the upsurges. Analysis, forecasting and early warning were inadequate, major interregional migrations were not predicted and alerts were not issued. As a result, the importance and necessity of a global overview were understood and DLIS was centralized at FAO headquarters in August 1978.



## **The 1985–1989 upsurge and plague**

The plague of 1986–1989 started with several outbreaks in the Central and Western Regions in summer 1985 that developed into an upsurge. Locust numbers increased after above-average rains fell across the Sahel from Mauritania to Sudan and Ethiopia during the summer of 1985. This eventually led to a plague that affected the Central Region in late 1987 and early 1988 that came to an abrupt end in early 1989.



In the Central Region, low-density hoppers and fledglings were controlled in August and September 1985 on the Red Sea coast of Ethiopia. The extent of summer breeding was certainly incompletely observed. Thus, considerable numbers of undetected adults began to reach both sides of the Red Sea in October. Consequently, an upsurge developed in western Saudi Arabia between Lith and Qunfidah in December 1985 following widespread heavy rains in November. Control operations by Saudi teams had been launched against hopper bands and swarmlets.

On the western side of the Red Sea, winter breeding began in the coastal areas of Sudan in November 1985. In early January 1986, hoppers of all instars were reported and two mature swarms appeared between Port Sudan and Tokar. Control operations were mounted in Saudi Arabia, Sudan and Egypt, which was invaded in early February. But some swarms escaped the control operations in Saudi Arabia and subsequent hopper infestations developed in the interior of Saudi Arabia between March and August. In early June, swarms were reported moving south to the Yemen Arab Republic, and gregarious breeding occurred in the PDR Yemen and in Oman.

In late June and early July, a swarm was reported on the western side of the Red Sea Hills in Sudan near Musmar. Serious locust and grasshopper populations were reported from northeast Ethiopia in July, a medium-density swarm was seen in early July on the coast where unconfirmed reports continued into early August. Two swarms were observed moving southwards across the Yemen highlands in early June and a third swarm was observed in August. Summer breeding was detected on the southern coastal plains near Ahwar and mature adults were found both in Wadi Hadhramaut and



further east in the interior of Oman. Control was mounted against these populations and against adults found in the Wahiba Sands of Oman during July. Yet again some locust swarms from the Arabian Peninsula escaped the control operations and reached the summer breeding areas in the Eastern Region. In September, late instar hopper bands and swarms had formed within a broad area of the interior of Sudan, extending from Darfur to the Red Sea Hills. Aerial and ground control operations were mounted but were not sufficiently effective. In November and December, numerous swarms moved eastwards to reach the Red Sea coastal plains of Sudan, Ethiopia, Saudi Arabia and the Yemen Arab Republic.



Desert Locust swarm attacking crops in Niger (1988)

Winter and spring breeding occurred around the Red Sea and control lasted until mid-January 1987 in Saudi Arabia and until late April in Sudan. In Ethiopia, breeding continued until July and gave rise to swarms that moved westwards to invade the interior of Sudan from late May and the highlands of northern Ethiopia from May to July. By the end of May, unusually heavy early summer rains, stretching from Niger to Ethiopia, provided excellent conditions for two generations of breeding. Aerial and ground control operations were undertaken in northern Sudan against hopper bands.

Despite the control operations, sufficient hoppers fledged and formed swarms. Some of them moved to the Red Sea coast of Sudan and to adjacent parts of Egypt, but no survey or control operations were possible because of security concerns. In Darfur, numerous swarms formed in October and November 1987 and migrated to Northwest Africa where unusually heavy and widespread rains fell allowing the swarms to breed during the winter. Widespread summer breeding also took place in central and eastern Sudan. These infestations were only partly controlled because of the difficult terrain. Consequently, swarms escaped to the winter breeding areas where breeding was confined to the Red Sea coast north of Port Sudan and in southeast Egypt.

By early April 1988, control operations finished in Sudan and Egypt but several swarms escaped from these areas and bred in northern Saudi Arabia. This was supplemented by spring-bred swarms from Northwest Africa that moved across northern Egypt. Control operations were undertaken against hopper bands and swarms in the interior of Saudi Arabia from mid-April until June.



© CFA

Controlling locust infestations with exhaust nozzle pesticide sprayer (1988)

Swarms from extensive breeding in Northwest Africa during the winter and spring started to migrate south in West Africa in March and then continue eastwards south of the ITCZ, the so-called southern circuit movement. They were joined later by other swarms from Northwest Africa to invade western Sudan in late May 1988. Widespread gregarious breeding started in June, extending to Eritrea and Yemen where they were invaded in late July. Control campaigns failed to prevent first generation summer swarms from forming. Some of the swarms bred again, causing hopper bands to be present until December in Sudan while others moved to the Red Sea coast of Sudan and laid eggs from mid-September onwards. Swarms became more widespread during October when they also reached Ethiopia, Djibouti, Egypt and Saudi Arabia and bred. In late October and November, swarms and breeding were reported from Yemen. Intensive control campaigns were launched when the summer-bred swarms reached the winter and spring breeding areas in Saudi Arabia, Ethiopia and Sudan, and continued until December. In late October and early November, several swarms invaded the Kuwaiti-Iraqi border and groups reached Qatar, Bahrain and southwest Iran. At the end of November 1988, swarms from Northwest Africa invaded northern Egypt and adults reached Lebanon, Syria and Turkey. In December, swarms spread eastwards again and control was carried out in northern Saudi Arabia, Jordan, Qatar and the United Arab Emirates. Control continued into 1989, finally ended in Kuwait in January, in Egypt and Yemen in February, in Saudi Arabia at the end of March and in Sudan in early April.

The Desert Locust plague had reached its climax by mid-1988 and then came to a dramatic decline in late 1988 and early 1989. Three primary factors contributed to this: (a) unfavourable ecological conditions during the winter and spring of 1988–1989 which did not allow for breeding in Northwest Africa, on the Red Sea coastal plains and in the interior of Saudi Arabia, (b) control efforts particularly in Saudi Arabia and Morocco, and (c) many locust swarms were blown over the Atlantic Ocean between September and December 1988.

## **The 1992–1994 upsurge**

During the 1992–1994 upsurge, there were at least eight generations of successful breeding, 22 countries of the Central, Western and Eastern Regions were affected and 4 million ha were treated, more than half of which were undertaken in the Central Region.

In mid-October 1992, an outbreak developed between Port Sudan and Massawa on the southern coastal plains of the Red Sea in Sudan and the northern plains in Eritrea where breeding conditions were extremely favourable. Numerous laying groups and swarms and hopper bands were present throughout November. In Eritrea, late instar hoppers and a 120 km<sup>2</sup> low-density breeding swarm was reported. In Sudan, survey teams recorded hopper bands of all instars and fledglings as well as six sightings of small, maturing and breeding swarms. In Saudi Arabia, no hopper infestations were present until mid-November when they found three small swarms that had crossed the Red Sea and were breeding near Jeddah.



The major population increases that occurred in November cannot be attributed solely to breeding on the coast but most likely arose from at least two generations of breeding on heavy and prolonged summer rains in the interior of Sudan and possibly western Eritrea that was not well reported. It may have been augmented by adults arriving from northern Somalia and the railway area of eastern Ethiopia. It is noteworthy that rain fell on the Red Sea coastal plains in July and August, which is unusual but also a feature of previous outbreaks and upsurges.

The earlier stages of the upsurge were poorly recorded. The first signs that an alarming situation was developing and locust numbers were increasing in the summer breeding areas of Sudan only reached FAO in November. The poor and irregular locust monitoring was in part the result of insufficient resources, but also because of several armed conflicts in parts of the breeding areas. Consequently, it was difficult for FAO to develop a complete picture of the severity of the situation and, as a result, it could not provide adequate warnings of the extent of likely developments beyond the Central Region.

Control in Sudan and Eritrea were less effective than they should have been because of initially poor pesticide efficacy and security concerns that limited operations near the Sudanese-Eritrean border throughout the upsurge. Swarms continued to lay eggs in December and infestations extended from the southern Saudi Tihama into Yemen. An unconfirmed report of a swarm in eastern Yemen suggests that undetected breeding may have occurred during the summer in the Hadhramaut interior. Hopper infestations were also found in southeast Egypt in December, possibly the result of an invasion by new generation adults that moved northwards along the coast or emigrated from the Sudanese interior. Despite ground and aerial control of bands and fledglings on both sides of the Red Sea in January, substantial fledging occurred in February. This was followed by a serious extension of the infested area in March that took swarms to the northern Tihama and into the interior of Saudi Arabia.

Meanwhile, locust populations around the Gulf of Aden had been increasing in the autumn on the coasts of southern Yemen and northern Somalia. Gregarization and control began in Yemen in January 1993. In late April and early May, swarmlets were seen in Somalia flying west towards the Ethiopian border and several Migratory Locust swarmlets mixed with Desert Locust were seen in Ethiopia close to the Somali and Djibouti borders.

Spring rains were plentiful in 1993 as a succession of depressions affected the Red Sea coasts and the Arabian interior. Rains continued into May in Saudi Arabia, keeping the conditions suitable for breeding on the coasts and the interior of Saudi Arabia and Yemen. On the western Red Sea coast, the locust infestations in Sudan and Eritrea seemed to have been brought under control by April, but not so in Egypt where ground control against bands and immature swarms continued until May. In Eritrea however, low numbers of hoppers were still present in mid-May, and ground control began in June against new generation groups and bands.

Infestations were more serious in Saudi Arabia and an extensive aerial and ground campaign was mounted on the Tihama where infestations were brought under control by May. Only solitary locusts were reported on the Yemen Tihama in March and April, but gregarizing populations were controlled in April on the Gulf of Aden coast. During May, swarms were seen in the Yemeni highlands near Taiz, Ibb and over Sana'a while others laid eggs that hatched and formed bands in valleys on the eastern side of the highlands from Ataq in the south to Khabb oasis in the north near the border of Saudi

Arabia that lead to the interior desert in Shabwah, Marib and Al Jawf. Large-scale swarm formation occurred in June and July. Similarly, widespread breeding occurred in the interior of Saudi Arabia that led to the formation of numerous hopper bands and swarms. In late June and early July, substantial ground and aerial control operations were undertaken against some 70 immature swarms in the southwest interior.

The extent of undetected breeding and the importance of swarm escapes from the interior of Yemen and Saudi Arabia became apparent and eventually led to an invasion of the Western and Eastern Regions by locust swarms in summer 1993. The invasion of the Eastern Region commenced in late June and early July as swarms moved from the Yemen interior to the Gulf of Aden and then were carried by the southwesterly monsoon winds along the coast of Oman and across the Arabian Sea to Pakistan and India where they arrived from early July onwards. In Oman, immature swarms first appeared in southern coastal areas of Dhofar on 2 July and further north near Ras Al Hadd on the 11<sup>th</sup>. Ground and aerial control operations were quickly mounted against the fast-moving swarms that were obviously in transit to the Indo-Pakistan summer breeding areas.

The invasion of the Western Region started slightly earlier in early June when immature swarms from Saudi Arabia crossed the Red Sea and flew over southern Egypt and northern Sudan. As they were north of the ITCZ and the summer rains had not yet commenced, breeding areas were dry so they continued further west over the northern Sahel until they reached suitable areas in southern Mauritania by late July.

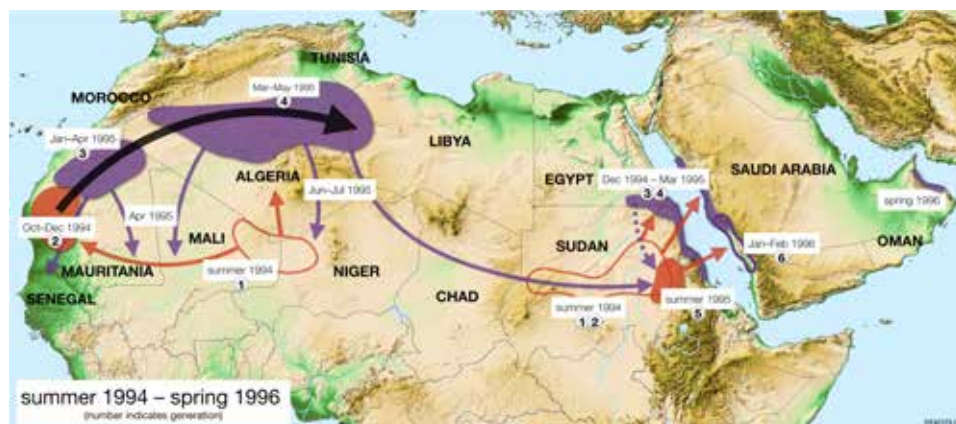
However, there were a 123 reports of swarms from June to mid-July in the interior of Sudan. Most of the swarms matured and laid eggs in North Kordofan owing to heavy rainfall and favourable breeding conditions. Successful ground and aerial control operations of the resulting hopper bands and swarms up to early October prevented a further escalation of the upsurge. By October 1993, swarming populations disappeared in the Central and Eastern Regions. But the upsurge continued in the Western Region until May 1994. During the upsurge, 2.2 million ha were treated of which 1.7 million were in Saudi Arabia and the remaining were in Sudan (281 065 ha), Yemen (156 650 ha), Eritrea (27 570 ha), Egypt (20 400 ha), Oman (10 900 ha), Ethiopia (800 ha) and Somalia (300 ha).

### **The 1994–1996 upsurge**

An outbreak developed in Sudan by October 1994 that later expanded to both sides of the Red Sea. Control operations nearly brought the situation under control in the following spring, but swarms from the Western Region or southern Egypt invaded Sudan. Subsequent summer breeding led to the formation of more swarms that moved to both sides of the Red Sea but limited winter breeding combined with control operations brought the situation mostly under control by May 1996.



Desert Locust populations were sparse in the Central Region during the first half of 1994 when the 1992–1994 upsurge was ending in the Western Region. Summer rains were heavy in the Sahel throughout the season. From August onwards, favourable breeding conditions also existed in Sudan that extended unusually far north into the Nubian Desert where the rains had flooded some wadis. From October 1994, it became obvious that locusts had started gregarizing.



By November 1994, swarms had formed in the summer breeding areas of the interior of Sudan. Some swarms emigrated whilst others continued breeding and were controlled until December. Successive waves of summer swarms and adults emigrated towards winter breeding areas on the Red Sea coast, but the appearance of swarms in Egypt in February 1995 suggests that late summer breeding may have continued longer in the Nubian Desert. Scattered adults started to breed in the Wadi Oko area and were present in southeast Egypt in late October. Elsewhere, scattered mature adults reached Tokar and laid eggs in mid-November. Scattered laying occurred in northern Eritrea during the first half of December. Most of the western Red Sea coast was dry until rains fell in late November and December. However, vegetation on the Saudi Tihama was reported to be green.

The first confirmed reports of breeding swarms occurred in late November and early December on the central and northern Saudi Tihama and from mid-December until mid-January 1995 in Sudan between Suakin and Tokar. The heaviest breeding occurred in Saudi Arabia where large numbers of second-generation bands were produced in February. Control operations against swarms and bands continued until April. Swarms from the eastern Red Sea coast moved into the interior of Arabia in late March and early April and probably dispersed as no further sightings were reported. On the western Red Sea coast, control against scattered breeding in Sudan and Eritrea started in December and continued in Eritrea into March.

In Sudan, hopper groups were controlled in January and bands occurred in February but by March, hopper groups, bands and fledglings were confined to the Wadi Diib area. Further northwest, swarms, probably from late summer breeding in northern

Chad and Sudan, laid eggs in the Nubian Desert on both sides of the Sudanese-Egyptian border from the Nile Valley to the Red Sea coast in February, giving rise to small bands from March. Small-scale breeding continued in Egypt until July 1995.

The upsurge in the Central Region would have ended in spring 1995 but scattered mature adults arrived during June in western Sudan followed by small swarms in early July from Northwest Africa where an upsurge was already in progress. These swarms continued moving eastwards through Sudan and reached western Eritrea. It is also possible that these swarms originated from southern Egypt. Good rains fell during July in the summer breeding areas, especially eastern Sudan and western Eritrea, as well as on the Tihama of Saudi Arabia and Yemen. Rains fell again in Saudi Arabia during August.

Consequently, gregarious summer breeding occurred in eastern Sudan and western Eritrea, and on the Saudi Tihama. Summer-bred swarms from Sudan and Eritrea arrived along the western Red Sea coast in late September when it was still dry and most of them crossed the Red Sea to Saudi Arabia and Yemen in early October. Only limited breeding occurred in Sudan in November. Additional swarms reached Saudi Arabia in December and successful breeding gave rise to hopper bands that were controlled on the Saudi Tihama in January and February 1996.

Ground teams treated scattered adults produced from later, limited spring breeding on the Saudi Tihama near Qunfidah in May and June. In northern Oman, hoppers and immature adults began to gregarize in May as vegetation dried out on the Batinah coast, and ground and aerial teams treated 4 000 ha. This left only low numbers of locusts present in the region at the end of spring breeding 1996.

### **The 1996–1998 upsurge**

The 1996–1998 Desert Locust upsurge was initiated by a cyclone that brought widespread heavy rain to Oman and Yemen in June 1996. Nine countries in the Central Region were affected by the upsurge and nearly 800 000 ha were treated.

Although a mature swarm was seen in western Sudan near the Chad border in mid-July, summer breeding was on a very limited scale in 1996. In June, a cyclone brought widespread rain to Oman and Yemen that allowed two generations of breeding in interior and southern coastal areas of Yemen. By July, first generation hoppers and fledgling were forming bands and groups, and ground control operations were initiated. In September and October, second generation hoppers were gregarious and adult groups formed throughout the infested areas. Control operations concluded in early November.

Locust swarms arrived in Saudi Arabia from the interior of Yemen and perhaps from Sudan in December. Low-density populations of mature gregarious adults were initially observed in the Red Sea coast of Saudi Arabia at the foothills from Qunfidah to

Jeddah and east of the mountains near Taif. Heavy rains had fallen on the northern Tihama in November and along the remainder of the Tihama in January and March 1997. In February, teams in both Sudan and Saudi Arabia saw swarms that gave rise to hoppers in Sudan and hopper bands in Saudi Arabia during March. Hatching and bands formed in Saudi Arabia within a large area between Jeddah and Umm Lajj, and fledging commenced by the end of April. By May, infestations of hopper bands and fledglings were present along a 900 km stretch of coast from Lith north to Duba.

The Saudi NLCU launched a large-scale control campaign that involved 70 ground teams and four aircraft. The campaign finished in June after treating nearly 340 000 ha. As a result of the control operations, only small adult infestations remained that moved south towards the summer breeding areas in the interior of Yemen where small-scale breeding occurred until November but control was not required. Low-density populations were also present and breeding at times in southern Egypt.



In Sudan, three immature swarms, probably arriving from Saudi Arabia, invaded the Sudanese coastal plains in mid-May 1977 and dispersed into the Red Sea Hills. At the end of the month, unconfirmed reports of an immature swarm came from the Baiyuda Desert, west of Atbara. In June and July, swarms were reported from Wadi El Milk in North Kordofan and other swarms were seen near Geneina in West Darfur. Breeding conditions were good in large parts of these provinces and scattered adults were present throughout the area. Control against hoppers began in August and the first swarms appeared in the east between Derudeb and Kassala in early September. In Eritrea, some locusts had remained on the coastal plains during the summer.

In October and November, heavy rains fell on both sides of the Red Sea that provided good breeding conditions as far north as the Sinai Peninsula. Rains also fell in interior of Saudi Arabia and along both sides of the Gulf of Aden. Summer-bred swarms from the interior of Sudan arrived on the coasts of Sudan in late October and Eritrea in early November and bred. Control operations were carried out against hopper bands in November and continued during December. From mid-December onwards, new generation swarms formed, some of which crossed the Red Sea in January 1998 to the coastal plains of Saudi Arabia and probably to nearby areas of Yemen while others moved north and invaded Egypt in January and February where control teams treated 50 000 ha before the swarms could mature.



A locust team waiting for swarms to settle before starting control operations

While control operations against hopper bands and swarms were declining in Sudan and Egypt during February and March, substantial breeding was underway in Saudi Arabia and, to a lesser extent, in Yemen as a result of the swarm invasion in January and February. A large-scale control campaign was mounted by Saudi Arabia against the resulting hopper bands from Jizan to Rabigh, which were heaviest between Qunfidah and Lith. In Yemen, infestations were concentrated on the northern coast between Bajil and Midi. Additional laying occurred in March near the Saudi/Yemeni border that produced new hopper bands in April and swarms in May. Consequently, control operations in both countries continued into May.

In northwest Somalia, scattered locusts were reported in the winter breeding areas at the end of 1997. Hopper bands and a few small swarms formed, which were also observed in Djibouti in late February and early March 1998. Swarms and some adult locust groups that probably originated from Somalia were reported in adjacent parts of Ethiopia in March and April 1998.

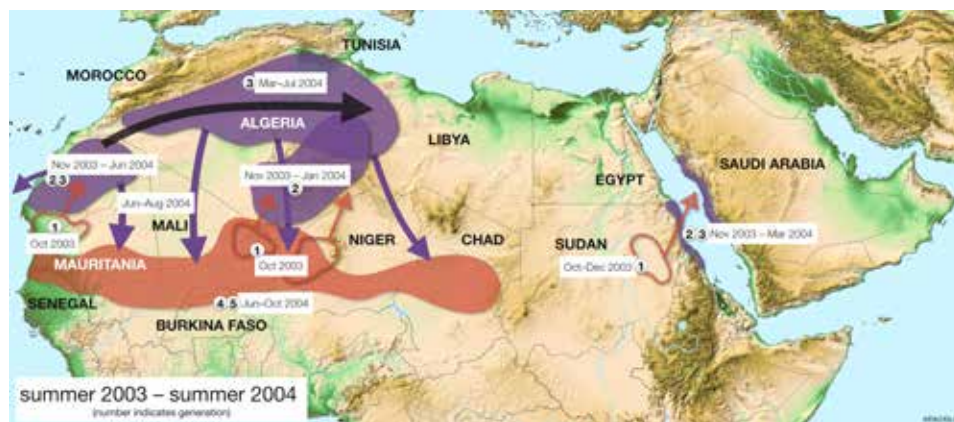


By late June 1998, no further swarms were observed in the region, indicating that the upsurge had come to an end as consequence of intensive control operations and unfavourable breeding conditions. In all, nearly 800 000 ha were treated, mainly in Saudi Arabia (619 987 ha) but also in Sudan (90 033 ha), Egypt (50 267 ha), Yemen (35 190 ha), Ethiopia (2 450 ha), northern Somalia (1 300 ha) and Eritrea (400 ha).

### The 2004–2005 upsurge

The 2004–2005 upsurge developed from three simultaneous outbreaks in the Western Region and one outbreak in the Central Region during October 2003. Consequently, the upsurge affected the Western Region more than the Central Region. Nevertheless, some 460 000 ha were treated during control operations carried out by the NLCUs in the Central Region.

The Desert Locust situation started to deteriorate in July 2003 in Sudan as a result of widespread rainfall in the interior where small-scale breeding was detected by survey teams in North Kordofan, North Darfur, and White Nile states. By mid-October, three maturing swarms arrived along the banks of the River Atbara. Breeding continued east of the Nile Valley to the Red Sea Hills where hoppers formed small groups and bands that caused an outbreak to develop by the end of the month. Immediately, ground control operations were launched in the River Atbara area and, to a lesser extent, in North Kordofan. Nevertheless, swarms formed and moved further east towards Haiya on the western side of the Red Sea Hills where additional breeding took place. In late November and throughout December, locust numbers continued to decline in the interior west of the Red Sea Hills.



Despite treating more than 18 500 ha between October and December, several adult groups and swarms managed to reach the Red Sea coastal plains and control operations were resumed. During January, locust numbers increased along the Red Sea coastal plains near Tokar Delta and in the north near Mohamed Qol and Oseif. Numerous small hopper bands formed in the north while at least one hopper band was seen in the Tokar Delta. Adult groups formed in these areas during February and early



March. Shortly thereafter, ground control operations concluded on the coast, having treated nearly 900 ha since December. However, several mature adult groups and swarms moved on strong easterly winds from both sides of the Red Sea to the Nile Valley on 1–5 March where they appeared in irrigated crops near Dongola and Abu Hamed and laid eggs. Hatching commenced by the end of the month and small high-density hopper bands were forming. Control operations continued against the hopper bands during April and May, bringing the situation back under control after treating 1 500 ha since March.



Locust hopper band control with a vehicle-mounted ULV sprayer

In Egypt, locust swarms and adult groups from the summer breeding areas in Sudan arrived during October 2003 in the Western Desert and along the shores of Lake Nasser and Tushka, and ground control operations were mounted. These operations increased in November in response to an increase in the densities of immature and mature *transiens* adults that reached up to 6 000 adults per ha in crops and natural vegetation. Although egg-laying occurred near Lake Nasser during December, locust numbers continued to decline. On the Red Sea coast, scattered adults were reported in January and hopper bands of all instars and fledglings were seen in February, suggesting that undetected breeding took place near the Sudanese border. Control operations continued on the coast until mid-March. Earlier in the month, several immature and mature swarms from both sides of the Red Sea and northern Sudan appeared and laid eggs in farms near Lake Nasser and control was carried out. Solitarious mature adults arrived in several oases in the Western Desert between Kharga and Bahariya and laid eggs. Breeding continued in April with hatching and control operations against hopper groups during the following month. By the end of May, Desert Locust numbers had declined. During the October 2003 to July 2004 campaign, ground teams treated some 9 300 ha, including Tree Locust and African Migratory Locust in control operations carried out from May to July.

In Saudi Arabia, locals reported seeing a small mature swarm on the northern Red Sea coast near Yenbo and Bader on 24 October 2003 but survey teams were unable to find the swarm. On 18–22 November, several mature swarms from Sudan invaded the Red Sea coastal plains north of Jeddah to Umm Lajj and laid eggs. Ground and aerial control operations were immediately initiated. During December, there was a substantial increase in locust numbers as hatching and band formation occurred on the Red Sea coast between Jeddah and Yenbo, supplemented by more adult groups and swarms laying eggs. Some adult groups entered the Hejaz Mountains and breeding occurred in Khaybar, Medinah, Taif and Al Baha as well as on the adjacent Red Sea coastal plains near Qunfidah.

During January and February 2004, numerous small hopper bands continued to be present on the Red Sea coast between Jeddah and Umm Lajj as a result of a second generation of hatching. Immature swarms formed from late January onwards and groups of adults started to move into the spring breeding areas of the interior in mid-February but breeding never occurred because of poor rainfall. In late February and early March, there was a dramatic decline in locust infestations along the northern Red Sea coast, coinciding with several days of easterly winds that carried adult groups and a few swarms across the Red Sea to Egypt and Sudan. Thereafter, only limited breeding occurred near Yenbo where small hopper bands formed in March and persisted during April. More than 147 000 ha were treated during the ground and aerial control campaign carried out from November 2003 to April 2004. In Eritrea, hopper bands formed on the northern Red Sea coastal plains near the Sudanese border during January 2004 and one DLCO-EA aircraft carried out control operations at the end of the month, treating 1 920 ha. These infestations were probably an extension of those in adjacent coastal areas of Sudan.

The situation remained calm in the Central Region during the summer while a significant upsurge was in progress in the Western Region. On 28 October 2004, several small immature swarms originating in the summer breeding areas of the Western Region arrived from adjacent areas of Libya and invaded Mediterranean coastal areas in northwest Egypt. About a dozen swarms moved along the coast and infested cropping areas in the Nile Delta between Cairo and Alexandria. One swarm appeared in the northern part of the Western Desert near Bahariya. Several groups and swarms invaded Cyprus and coastal areas of Israel and Lebanon between 30 October and 3 November.

A large swarm flew over Cairo on 17 November 2004 and continued to the Gulf of Suez. Thereafter, several groups and small swarms dispersed over the Sinai Peninsula, invading Gaza and the West Bank of Palestine, the Negev Desert in southern Israel, western Jordan and the Gulf of Aqaba and the northern Red Sea coast in Saudi Arabia on 19–25 November. A few adults reached the Mediterranean coast of Syria. Most of the locust groups and swarms moved south along the Red Sea from Sharm Esh Sheikh to Hurghada and Marsa Alam, reaching Berenice by the end of the month, and some continued into northeast Sudan in December.

During the first half of December, there were numerous reports of immature groups and swarms in the Nile Valley between Wadi Natroun and Sohag, and throughout the oases in the Western Desert of Egypt. Breeding occurred on the Red Sea coast and in subcoastal areas along both sides of the Egyptian-Sudanese border in January 2005, giving rise to small hopper bands that began to fledge and form immature groups and swarms in mid-March. Infestations declined on the Red Sea coast during April because of control operations while the remaining adults moved inland to Lake Nasser and the Nile Valley in northern Sudan.



On 25–30 May, several immature swarms invaded West Darfur in Sudan, coming from the upsurge in the Western Region and carried by westerly winds to the south of the ITCZ. This rare movement is referred to as the southern circuit and normally only occurs during plagues and large upsurges. Some of the swarms remained in Darfur, matured and laid eggs that hatched in June, causing hopper bands to form. Ground control operations were undertaken and continued until mid-September but not all areas could be treated because of insecurity. A small number of swarms continued to move east in June and reached northern Ethiopia where they laid eggs that hatched in July and a few small hopper bands formed that were treated.

In late July, a small outbreak developed on the northern Red Sea coast perhaps as a result of undetected adult groups that arrived from the west in June. Consequently, small hopper groups and bands formed, and ground teams treated more than 20 000 ha in July and August. By autumn 2005, the upsurge had finally ended in both regions. From October 2003 to August 2005, control operations were undertaken by Egypt (237 091 ha), Saudi Arabia (156 692 ha), Sudan (44 038 ha), Eritrea (22 055 ha), Jordan (6 532 ha), Cyprus (462 ha), Ethiopia (264 ha) and Lebanon (10 ha). An unknown amount of control was also carried out in Israel.

The locust upsurges and plagues in the Central Region since 1966 demonstrate that NLCUs often failed to detect dangerous developments at their early stages because of inadequate monitoring capabilities. The resulting high costs and environmental damage

caused by delayed reactive control triggered the concern of FAO, the affected countries and the international community. This eventually led to important improvements in how locust populations could be managed more effectively and at much lower costs. It also reiterated the importance of a centralized DLIS. By the time of the upsurge of 2004–2005, the NLCUs and CRC were better prepared and could respond faster and more effectively to the threat.

### **3.3 Preventive control**

The objective is simple and challenging at the same time  
“to find economically important locust populations  
and destroy them as efficiently as possible.”

(G. Popov, 1970)

**I**n contrast to the curative or reactive Desert Locust control strategy that existed in the old days, the concept of prevention is nowadays adopted by most locust-affected countries and international organizations. Though preventive control was generally accepted by the 1980s, it is not a new idea and dates back to the early twentieth century. When starting to understand locust population dynamics better, scientists believed that all locust plagues originated from within small outbreak areas and that plagues started when swarms escaped and bred successfully outside these areas. They postulated that stopping swarm formation in these restricted areas could prevent plagues. The objective was, and still is, to detect initial gregarious locust populations as early as possible and to control them by the most appropriate technical means while they are still small and before they can spread to become much larger.

The expectation is to prevent substantial damage to the livelihoods of farmers and pastoralists and to save the high national and international costs involved in bringing a plague to an end. From the earliest attempts to implement this strategy, it proved to be much more difficult than first assumed, and its strategic and economic rationale is, at times, still being debated today<sup>[1]</sup>.

The origin of preventive control goes back to B.P. Uvarov who proposed a plague prevention strategy after realizing that in the Caucasus and central Asia, Migratory Locust swarms emerged from within restricted outbreak areas. The ultimate aim of his proposal was to avoid crop damage in the major agricultural areas of Africa, the Near East, Iran and Indo-Pakistan.

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*[1] Some important arguments claim that swarm control is more efficient, less costly, and easier to perform than hopper band control, especially when using non-persistent pesticides. The idea behind this is that a swarm is much smaller in area than the vast zone that may contain several hopper bands, particularly when considering that bands occupy only 1–5 percent of such areas. Hopper bands are also extremely difficult to find and demarcate, and it is extensive and expensive to spray such scattered targets, not least for environmental considerations. For these reasons, the EMPRES/CR Programme focused on upsurge/plague prevention rather than on outbreak prevention.*

The initial plague prevention strategy worked spectacularly well in the case of the African Migratory Locust and the Red Locust, which have permanent and well-confined outbreak areas that are relatively easy to be kept under surveillance. In contrast, Desert Locust plagues proved to be much more difficult to prevent. This species is not confined to permanently infested outbreak areas from which swarms could escape to start a plague or an upsurge. Gregarization can take place anywhere in the large recession area of some 16 million km<sup>2</sup> that extends from the Atlantic coast of Mauritania through Arabia to the Rajasthan Desert in India. It can even occur in areas where outbreaks have never been recorded before.

Research in the 1930s revealed that the original preventive control strategy was not applicable for Desert Locusts. Mapping of Desert Locust sightings and concurrent weather events showed that swarms migrated between widely separated areas in the Western, Central and Eastern Regions, and that their location varied significantly between years because of erratic rains that provided either suitable or unsuitable habitats for locust breeding.

Consequently, Desert Locust plague prevention requires many survey teams to monitor the widely separated but complementary breeding areas during recession periods in which locusts might gregarize after adequate rains. From the 1960s, recession populations were monitored more systematically in extended ecological surveys. With technological advances, the tools needed to combat pre-plague locust populations such as more effective insecticides, ULV pesticide application technology, and aerial control, became gradually available and made plague prevention a more feasible option. But the essential prerequisites for successful implementation of a preventive locust management strategy continue to be the human, organizational, structural and political factors that support early detection, early warning and rapid reaction.

First of all, a centralized and well-managed data management system is required to track Desert Locust movements and developments, detect hot spots within the vast recession area as early as possible and to issue warnings and alerts. And secondly, national locust control organizations participating in the global early warning network, capable to react effectively in a fire brigade style to a looming threat at any moment.

## **Early warning**

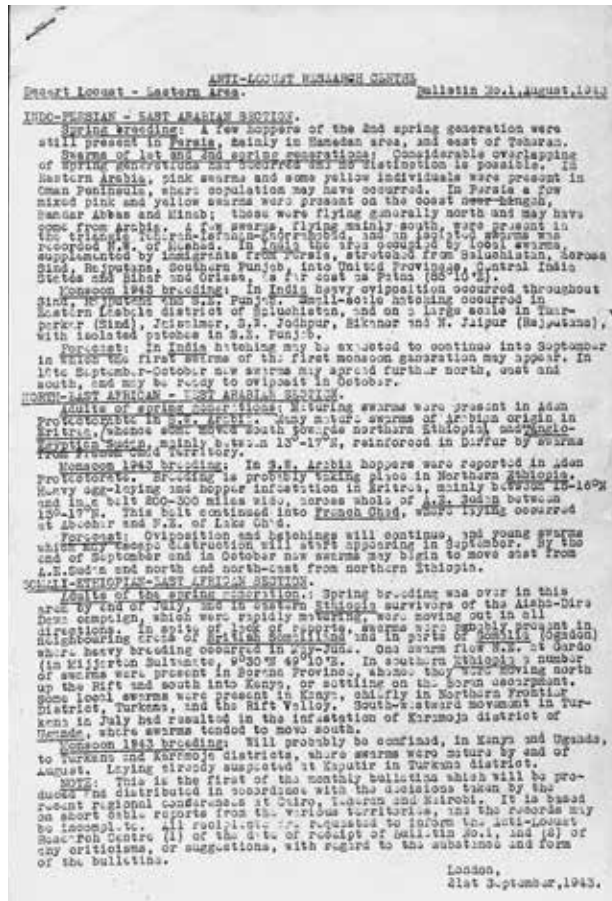
In 1929, the British Anti-Locust Research Centre (ALRC) in London first developed a centralized system of reporting and mapping of the Desert Locust distribution and movements, and organized a structured Desert Locust early warning system in the 1940s in connection with its Middle East Anti-Locust Unit (MEALU) to provide countries with monthly Desert Locust Bulletins and forecasts<sup>[2]</sup>. From 1958 onwards, the system continued working under the International Desert Locust Information Service (IDLIS) in London, supported by FAO. In 1978, it was transferred to FAO

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*[2] Today, medium-term forecasts are provided by FAO/DLIS at monthly intervals, short-term warnings are issued when dangerous developments are imminent.*



headquarters and became the Desert Locust Information Service (DLIS) within the Locusts and Other Migratory Pests Group. Initially, forecasting was a manual procedure based on cartographical analysis of locust, weather and habitat information received by radio, telex and post. Unavoidably, copying errors occurred quite frequently on the long way from the field before the information eventually reached DLIS. The 1986–1989 plague initiated efforts to improve the early warning system and to review the control strategy. As a result, an increasing number of field reports were transmitted by fax from the national locust control units to DLIS.



The first monthly Desert Locust Bulletin - September 21, 1943

The FAO Scientific Advisory Committee identified the geographic information system (GIS) as the most appropriate tool to help forecasters in their efforts. As a result, UNDP commissioned the development of the data management and analysis tool SWARMS (Schistocerca **W**ARNING and **M**ANAGEMENT **S**ystem) to replace the manual mapping and analysis techniques applied during the previous 60 years. SWARMS became operational in 1996 at FAO headquarters and was one of the first GIS used for operational monitoring rather than simply producing maps.

The programme provided DLIS forecasters with a management and analytical tool for locust, weather and habitat data that had interfaces for registering, indexing, cross-referencing, mapping and storing incoming reports from countries. The tool facilitates rapid retrieval, display and comparison of current data as well as more than 80 years of historical events with a wide range of maps and satellite imagery that can be zoomed into for more details. It also calculates frequencies of locust infestations and trajectories of swarm migration forwards and backwards in time. In addition, a new generation of satellite-based vegetation and rainfall products made it possible to guide national survey teams to zones most likely to contain gregarious locust populations.

## **Early detection**

The second requirement is that countries in the Desert Locust recession area maintain small permanent and well-qualified national locust control units to monitor rainfall, ecological conditions and locust populations effectively and on a regular and timely basis to feed information into the overall early warning system. The method of collecting and transmitting habitat information remained basically unchanged from the 1940s until the 1990s. Subsequently, the previous manual data recording and transmission procedures via radio, telex, post and fax were gradually replaced by computers and satellites.



A locust survey officer entering field observations into eLocust3

Developments in communication technology, the introduction of the Global Positioning System (GPS) and handheld computers (eLocust) since 2000 for recording field observations made it extraordinarily easier and faster to log and transmit georeferenced field information to the national locust information offices.

Experience in operating SWARMS and the introduction of computers at the national locust control units suggested that GIS-based systems should also be introduced for the benefit of national locust organizations. The objective was to facilitate mapping and analysing field data, to serve as a decision-making tool for campaign managers in organizing and directing survey and control teams and to facilitate data exchange with DLIS and other national LCUs.

The national GIS version, RAMSES (**R**econnaisance **A**nd **M**anagement **S**ystem of the **E**nvironment of **S**chistocerca), was designed to be easily used by the national locust information officers who were not necessarily computer or GIS experts. It was first introduced in Eritrea and Yemen starting from 1997. Since then, RAMSES has become an indispensable tool. It is now operated by all national LCUs in the frontline countries of the Central Region as well as in other regions. More recently, a new version, RAMSESV4 has been introduced that is based on open source and a flexible architecture in order to ensure its usefulness and sustainability for years to come.

### **Rapid reaction**

The third basic feature of effective plague prevention is the aspect of preparedness. Preventive control requires not only a functional early warning system with useful tools and small but permanent national locust control units, but also operational readiness and specific procedures at the national, regional and international levels. These should enable rapid mobilization of additional resources to mount early control interventions against outbreaks and the initial stages of an upsurge. But past mechanisms to fill the suddenly emerging gaps were disappointing.

In the early stages of the 1986–1989 plague, FAO established the Emergency Centre for Locust Operations (ECLO) as a focal point to coordinate emergency response and the mobilization of support from donors. The Director of the Plant Production and Protection Division at FAO headquarters was given extensive delegated authority to permit rapid decisions, expedite procurement and delivery of supplies. As a result, the international donor community provided a substantial part of the funds needed to mount large-scale plague prevention campaigns. But their willingness to contribute to future locust control campaigns as they have done in the past cannot be taken for granted, not least because of increased concern about the environmental side-effects of locust control. Thus, affected countries and FAO must find alternative, more self-reliant options to secure and eventually reduce or replace donor funding for emergency operations.

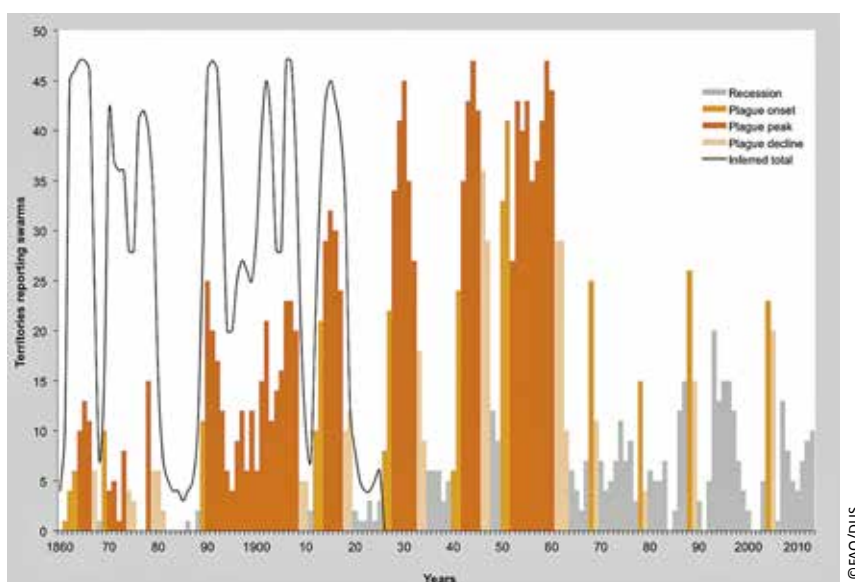
Experience from past emergency operations frequently proved that external aid only started to become effective six to eight months after an appeal to donors was launched. For plague elimination campaigns, this time lag is often too long to stop large-scale first generation swarm production and may eventually contribute to huge quantities of unused pesticide, which later become obsolete and places an additional environmental and financial burden to the countries and the international community.

Consequently, FAO put much effort into establishing new partnerships with other institutions such as the World Food Programme (WFP), the UN Central Emergency Response Fund (CERF) and locust-affected countries in order to obtain the necessary logistical support in time. This included rapid transportation of supplies, the provision of central storage capacity, procurement and lease of standard equipment, access to more rapid funding, pesticide triangulation and promotion of regional solidarity among affected countries.

In addition, it became clear that the responsibility for effective prevention was increasingly concentrating on the countries themselves. But they are often ill-equipped and lack functional incident command structures to quickly mount extraordinary measures and mobilize reserves as required to deal with locust infestations effectively. Consequently, the EMPRES/CR Programme focussed on strengthening the operational readiness of the frontline countries through national and regional contingency planning.

## Conclusion

Does the concept of plague prevention work? Is it economically beneficial? The long-term strategy of Desert Locust control adopted by DLCC in 1969 is to *reduce locust populations in order to prevent plagues and damage in major agricultural areas*. The positive effects that followed the development of increasingly more effective surveillance and control tactics, technologies and improved preparedness in recent decades appear obvious. The frequency of plague onsets remained similar (1966, 1977, 1986 and 2003), but none of these went on to reach the peak levels in population size and geographical extent that characterized plague onsets in 1926, 1940 and 1950; instead, they declined rapidly.



The frequency of Desert Locust upsurges, plagues and declines from 1860 to 2015

As a result, major crop growing areas in Asia, Eastern Africa and the Near East that were frequently infested during earlier plagues remained free from locust swarms. In addition, many outbreaks that occurred in the Central Region did not develop into an upsurge, and not all upsurges led to plagues. Probably, controlling gregarious upsurge and plague onset populations contributed to the rapid decline of recent plagues.

EMPRES/CR provided the forum to define locust management approaches and their possible economic advantages, stimulated contingency planning, and reviewed the operational readiness procedures of the frontline countries and of CRC. The combined upshot of this endeavour was exercised under real conditions in the 2003–2005 upsurge when simultaneous outbreaks occurred in 2003 in the vast summer breeding belt across the Sahel in the Western and Central regions. Several outbreaks were controlled in the Central Region in 2003 and 2004, and the situation was basically brought under control by May 2004 before swarms could spread into the Eastern Region and develop into a plague. But the upsurge in the Western Region, where preventive control was not yet fully operational, continued and affected almost all of the CLCPRO member countries and even beyond. More than 13 million hectares were sprayed with chemical pesticides in order to break the upsurge and more than 6.3 million litres of unused pesticides were left over at the end of the campaign and risked becoming obsolete.

The total cost of the campaign and rehabilitation in Northwest Africa was estimated at USD 400 million including food aid, multilateral, bilateral and national contributions. By contrast, in the Central Region less than 500 000 hectares were treated. Multi- and bilateral assistance to the campaign reached the relatively modest sum of about USD 3.4 million. The total cost of the campaign was estimated at about USD 7 million. Thus, the investment of USD 11.5 million into prevention through the EMPRES/CR Programme during ten years from 1997 to 2006 proved beneficial, particularly when bearing in mind the social and environmental costs that were avoided but are difficult to quantify.

<i>Region</i>	<i>North–Central Region</i>		<i>South–Central Region</i>	
<b>Plagues</b>	<b>Year</b>	<b>Cause(s) of decline</b>	<b>Year</b>	<b>Cause(s) of decline</b>
1926–34	1933	Unspecified	1932	Unspecified
1940–48	1947	Drought	1947	Drought
1949–63	1962	Emigration [1]	1963	Control [2]
1967–69	1969	Control	1969	Migration, control
1977–79	1978/79	Drought, control	1979	Control

**NOTES:**

[1] *Emigration*: Flights taking a population to another region.

[2] *Control*: Include reduced survival and breeding success because of sub-lethal pesticide doses.

**Causes of plague decline in the Central Region**

But past successes and the largely plague and damage free period since 1964 made the concept of plague prevention vulnerable and a fundamental question remains: did the control efforts, either preventive or curative, terminate the upsurges and plagues



or was it the unfavourable ecological conditions that contributed mostly to their decline? Or was it a combination of both factors? While it is difficult to answer this question with certainty, analyses of past upsurges and plagues suggests that it is often a combination of both factors.

However, the example of the 2003–2005 upsurge revealed that countries in the Western Region lacked adequate capacities in data collection, analysis and transmission to DLIS as well as insufficient training in contingency planning. The upsurge affected several countries that rarely suffered such problems and also exposed those frontline countries that had limited or inadequate national facilities.

Past experience has shown that financial shortfalls, organizational and operational weaknesses, insufficiently trained and staffed national locust organizations, inaccessible areas and political instability all present significant risks to the proper functioning of the plague prevention system. With this in mind, CRC needs to specifically reconsider the case of Somalia, which does not have a permanent LCU. Though Somalia is not yet a member of CRC for political reasons, it harbours some of the most important breeding areas within the Central Region and is a critical transit corridor of locust movements between the Arabian Peninsula and Eastern Africa. Somalia should therefore be kept as an integral part within the overall early warning system by supporting and strengthening the local locust monitoring and control capacities in collaboration with DLCO-EA. It should also be considered as a strategically critical element in the regional contingency plan.

Information recorded first by EMPRES/CR and now by CRC indicates that the national LCUs in some countries have sufficient capacities and resources during recessions to mount effective outbreak campaigns. But the question remains whether these resources are operational and under the direct control of the NLCUs or not. It is also important to establish the availability of the necessary equipment and its operational readiness. This should be reflected better in national contingency plans. It is virtually certain that national capacities in almost all countries will run short quickly when confronted with more serious scenarios and will require additional resources if successful campaigns are to be mounted at short notice. This implies a significant risk to the plague prevention concept while regional and international support are being organized and delivered with all the operational ambiguities implied. But as mentioned above, locust emergencies are becoming rarer and institutional memories at all levels are short, partly as a result of frequent staff turnover. Consequently, national governments and donors may forget their essential role in financing Desert Locust plague prevention.

An important aspect of contingency planning therefore is not only to raise donors' and countries' awareness of the reliance on their financial assistance when needed, but also their ability to properly justify and organize extra emergency assistance. Otherwise, donors may delay or even fail to provide the necessary funds. Providing the sole justification that gregarious locust infestations must be destroyed is certainly

no longer sufficient. Accountability, monitoring and evaluation procedures, and social and ecological arguments<sup>[3]</sup> must also be given.

Substantial indigenous regional and national efforts that contribute to plague prevention must also be demonstrated and are critical. The relatively modest amount of around USD 150 000 set aside as a reserve fund, as recommended by CRC at its 29<sup>th</sup> session, was an important step forward. However, it is probably not a convincing amount as it is much too small to make an impact when the next emergency occurs. Equally, the current level of commitment of the member countries to CRC is not yet sufficient to secure the development and introduction of new surveillance and control technologies that require profound changes to field methodologies and amendments of national locust control organization and practices. Further and more persistent efforts are thus required to prevent the next upsurge or plague.

*"Locust control is not an easy exercise.*

*Done properly it takes a lot of hard work and planning.*

*Just sorting out all the logistics required to keep a field operation with several aircraft [and ground teams] functioning on a daily basis is a major task in itself.*

*The recent [locust] operation really wore me out."*

(A practioner)

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[3] Obsolete pesticide disposal management, environmental impact monitoring procedures, pesticide stock management, alternatives to conventional pesticides etc.

## 4. The national locust programmes

**I**n 2016, CRC consisted of 16 member countries. Out of these, eight countries (Djibouti, Egypt, Eritrea, Ethiopia, Oman, Saudi Arabia, Sudan and Yemen) are categorized as being in the frontline because they harbour important seasonal Desert Locust breeding areas. They are thus strategically very important in preventing upsurges and plagues. In addition to these eight countries, Somalia also contains substantial breeding grounds that are significantly important for the entire region and beyond. Although Somalia is not a member of CRC, it cannot be neglected in the regional attempt to manage gregarious locust populations as part of the early warning and preventive control strategy.

The other eight member countries – Bahrain, Iraq, Jordan, Kuwait, Lebanon, Qatar, Syria and the United Arab Emirates – are without significant breeding areas and are therefore considered as invasion countries. But they can be directly affected by locust swarms originating from the frontline countries when preventive control is unsuccessful. For this reason, CRC has adopted a two-track defence system with a focus on the permanent monitoring of the breeding zones in the frontline countries and supporting the invasion countries to quickly mount appropriate counter measures when swarm invasions occur.

It is through sound regional coordination and solidarity, and by relentlessly contributing to their Commission, that the invasion countries provide essential support to the frontline countries in order to avoid suffering themselves from the eventual arrival of any locust swarms.

### 4.1 Frontline countries

#### Djibouti

**D**jibouti joined DLCO-EA soon after independence in 1977, and the Ministry of Agriculture established a National Locust Control Unit (NLCU) as part of the Crop Protection Section. It is managed by a locust coordinator who is responsible for coordinating survey and control matters with the regional locust organizations, for information management and for training activities.



The National Locust Control Unit at the Crop Protection Office in Djibouti

In 1996, Djibouti became a member of EMPRES/CR and eventually joined CRC in 2002. During this period, the NLCU staff gained good experience with locust survey and control and benefited from several training courses organized by EMPRES/CR, CRC and DLCO-EA as well from other assistance in-kind that strengthened and improved locust operations.

Currently, the NLCU has no well-defined organizational structure and it lacks the necessary support from the Government and thus depends very much on support from DLCO-EA and CRC.

### **Egypt**

**E**gypt has experienced countless invasions of Desert Locust swarms since prehistoric days. In order to protect crop production against these recurrent locust invasions, a Locust Section was created in 1962 as part of the General Directorate for Pest Control. Through a special decree issued by the President in 1964, the General Directorate for Locust and Agricultural Aviation Affairs (GDLAAA) was established as an independent service of the Ministry of Agriculture and Land Reclamation. The Directorate is mandated to protect the country from locust and grasshopper invasions and to regularly monitor Egypt's own Desert Locust breeding areas. The locust information office of the GDLAAA also closely observes the locust situation in neighbouring countries and follows the reports and updates provided by DLIS. The Directorate supervises about 1 000 locust officers, technicians and auxiliary personnel. It manages 13 main bases with 52 attached sub-bases throughout the country. All bases are all fully furnished and equipped with vehicles and control materials. The estimated annual budget for the Directorate is about USD 510 000 plus additional financial support from the national Crisis Management Fund during emergencies as required.

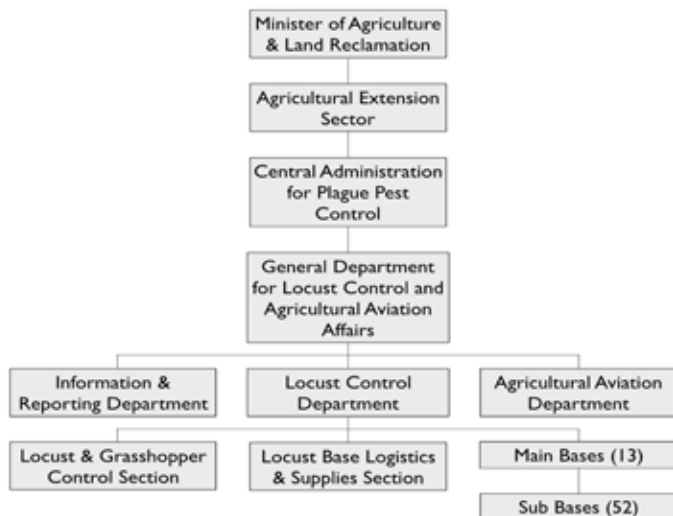


The General Directorate for Locust and Agricultural Aviation Affairs at the Ministry of Agriculture and Land Reclamation in Cairo, Egypt

Egypt harbours one of the important winter season breeding areas on the Red Sea coastal plains and the adjacent valleys south of Berenice to the border of Sudan. During the spring season, locust breeding can occur in the area around Lake Nasser and some of the new irrigation schemes located south of Qena. Since 1968, Egypt has experienced eight locust invasions. The GDLAAA managed to control most of the invasions with existing resources.

Before the EMPRES/CR Programme, Desert Locust control operations were initiated only after swarms had already invaded agricultural areas. The alerts were reported to the nearest locust base, which mobilized control teams according to the estimated

scale of infestation. But today, proactive surveillance operations are being conducted regularly in the winter and spring breeding areas. Locust observations are transmitted using eLocust equipment to the information office of GD/LAAA where the reports are recorded and analysed. When outbreaks or swarm invasions occur, countermeasures are initiated. The control teams are coordinated directly by the GD/LAAA.



The national locust control programme in Egypt

Good cooperation between the GD/LAAA and CRC and with other countries in the region has led to a significant reduction of the risks of Desert Locust invasions and contributed to better preparedness in the GD/LAAA. These relationships have been strengthened through joint surveys with the neighbouring countries. The exchange of experience with other national locust control units has improved Egypt's early detection and early warning systems. The introduction of advanced technologies has made control safer for the environment. Intensive support for human capacity building has also improved GD/LAAA's staff resources.

## Eritrea

Eritrea is one of the frontline countries in the Horn of Africa where Desert Locust breed and frequent outbreaks occur in the winter and summer breeding areas. During the summer, locusts breed in the western lowlands of the country mainly along Khor Barka in the north and between Teseney and Omhajer in the south in most years from about June or July to September or October. During the winter, locusts breed along the Red Sea coastal plains from about October to March.

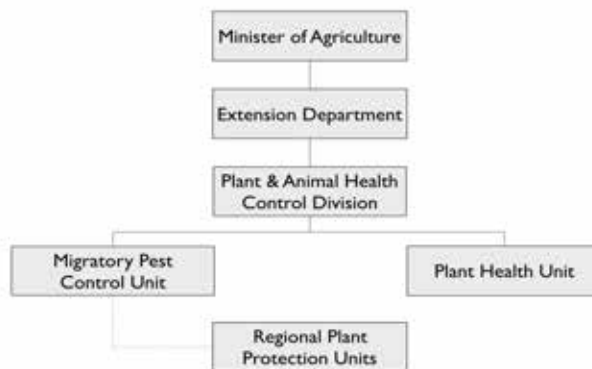


The Ministry of Agriculture in Asmara, Eritrea

©FAO



The Government of Eritrea has given top priority to animal and plant disease and pest management in order to safeguard food security, with particular importance attached to the Desert Locust. Since its independence in 1991, Eritrea has played an important role in the regional effort to control Desert Locust threats. Control was initially coordinated under the Department of Land Resources by its Plant Protection Division. In 2010, the Migratory Pests Control Unit (MPCU) was established under the Plant and Animal Health Division of the Agricultural Extension Department of the Ministry of Agriculture (MoA). The MPCU is located at the MoA in Asmara. It has three locust officers whose main task is to coordinate, among other migratory pest issues, the various Desert Locust control activities with the local plant protection offices. Most of the field staff, 80 Desert Locust and plant protection officers and 25 scouts, are based at the regional agricultural offices.



The national locust control programme in Eritrea

Since 1997, the control strategy gradually shifted from curative to preventive approaches. Appropriate risk preparedness is being recognized as one of the most essential components and is considered the key to the success of the preventive Desert Locust control strategy. It is based on early detection and rapid reaction which contributes to safeguarding crops, protecting livelihoods, and reducing the quantity of pesticides used and their negative impact on the environment.

Regular survey operations during the winter and summer seasons are undertaken on a monthly basis by the officers and scouts of the regional agricultural offices in the locust breeding areas. The survey information is communicated daily to the Desert Locust information office in Asmara through the eLocust equipment. This office is exclusively equipped with the RAMSES GIS for managing and analysing all the field data to assess the Desert Locust situation and make proposals for management decisions. The survey data are shared with DLIS, CRC and DLCO-EA. Moreover, a national Desert Locust Bulletin is usually issued every month by the information office to inform the Government, CRC, DLCO-EA, the neighbouring countries and other interested parties about the locust situation in the country. During Desert Locust outbreaks and critical situations, weekly meetings are conducted and chaired by the Minister of Agriculture to decide on the necessary actions. Ground control is conducted exclusively by trained personnel.

In case of larger infestations, DLCO-EA dispatches one of its aircraft to support control operations. In order to motivate the teams in the field to sustain the operations under harsh conditions for many days if not weeks, the Government of Eritrea provides the MPCU with a flexible budget. In crisis situations, the Ministry of Finance supports the operations with extra emergency funds.

Because of great concern about the environmental and human safety aspects of chemical pesticides, the MPCU undertakes the maximum effort to reduce environmental risks according to the recommendation of the FAO Desert Locust Guidelines on Safety and Environmental Precautions. In 2012, the MPCU assigned a focal person for implementing the Environmental and Health Standards for Desert Locust Control.

Generally, only ULV formulated pesticides, which are registered in the National List of Chemicals, Proclamation Act 155/2006, issued by the Regulatory Services Department of the MoA, are allowed for locust control. The biopesticide Green Muscle™ was registered in 2014 and can be used for locust control in environmentally sensitive areas of the country. Unfortunately, appropriate storage facilities and laboratories for the biocontrol agents are still lacking.

For more than 50 years, FAO has been an important leader in Desert Locust management. Its DLIS provides continuous technical support to improving locust information management, sends regular updates of the global locust situation and alerts the individual countries that are at risk. Before Eritrea joined CRC in 2006, it was member of the FAO EMPRES/CR Programme since 1996. It was during this period that the basis for preventive locust management in the country and for interregional cooperation was laid.

The MPCU of Eritrea works very closely with CRC and the other member countries to strengthen regional preventive control capacities and to launch early responses when Desert Locust emergencies occur. CRC is a forum for regularly bringing member countries together to discuss issues of common concern in Desert Locust management and to share expertise and knowledge. It provides guidance and support for building and strengthening national control capacities.

Eritrea benefited from many training courses, meetings and technical workshops organized by CRC and FAO. A comprehensive training programme was initiated by EMPRES/CR and later pursued by CRC with the objective to qualify national trainers who would then be able to train national field staff on various Desert Locust subjects.

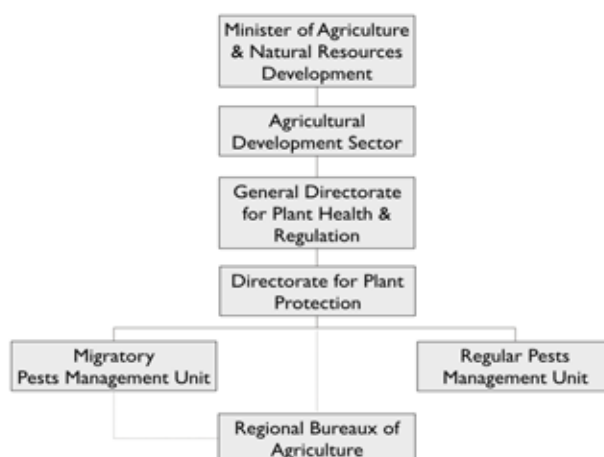
## Ethiopia

Ethiopia has one of the oldest Desert Locust programmes in the region. Pest control started in the 1940s with a focus on Desert Locust control because locusts were causing significant economic damage at that time. In 1956, the first permanent national locust control unit was organized and some survey and control actions started. The Desert Locust and the African Migratory Locust, the armyworm and grain-eating quelea birds are categorized as migratory pests in Ethiopia.



The Ministry of Agriculture and Natural Resources Development in Addis Ababa, Ethiopia

The Ministry of Agriculture and Natural Resources Development (MoANRD) in cooperation with the Regional Bureaux of Agriculture (RBA) is responsible for both ground and aerial management of migratory pests, with support from DLCO-EA when required. Within the MoANRD and its Plant Protection Directorate, a specialised case team, the Migratory Pests Management Unit (MPMU), works on migratory pest surveillance and control. The routine activities of the MPMU include carrying out regular surveys in areas known to be ecologically important for migratory pests, creating awareness within local institutions, conducting regular staff training, organizing funding and supplies to the local offices, and carrying out control operations whenever required.



The national locust control programme in Ethiopia

Ethiopia is one of the Desert Locust frontline countries that contain areas suitable for locust breeding and gregarization. The eastern, northern, southeastern and southwestern lowlands are key areas. Historically, outbreaks occurred locally or swarms invaded from Sudan in the west, Somalia in the east and the Arabian Peninsula in the northeast.

In the last 30 years, about ten Desert Locust outbreaks and invasions have been observed in Ethiopia (1986, 1987, 1988, 1993, 1998, 2005, 2007, 2008, 2009 and 2014). The last locust invasion in eastern Ethiopia was one of the most extensive in nearly 50 years. There were some 40 reports of immature Desert Locust swarms arriving in eastern Ethiopia that came from northern Somalia and moved towards the western, northwestern and eastern highlands of the country. Although the scale of the infestation and the mobility of the swarms over difficult terrain made survey and control operations extremely demanding, the MoANRD, DLCO-EA and the regional states succeeded in bringing the infestation under control, and thereby preventing serious damage to agricultural production.

The MPMU receives regular technical and other support from regional and international institutions that are working on migratory pests such as DLCO-EA, CRC and FAO. The interaction between FAO and Ethiopia has always been strong, particularly during serious Desert Locust infestations years. EMPRES/CR and later CRC have been providing substantial support to the country in terms of staff training and material assistance. CRC and DLIS organize annual training for Desert Locust information officers from member countries to strengthen the locust information network and early warning system, and to introduce and provide training on the latest technologies.

The short-, mid- and long-term courses and studies supported by EMPRES/CR and CRC have played an important role in building the capacity of the MPMU and the RBA to improve national early detection and monitoring capacities. These efforts have led to better application of the preventive control strategy in Ethiopia and enabled the country to undertake more timely and efficient control operations.

## **Oman**

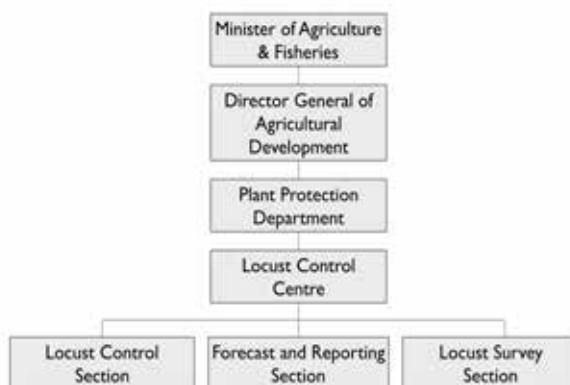
**O**man is not only a frontline country but also a strategically important transit zone for Desert Locust migrating between the Central and Eastern Regions. In the past three decades, Oman has experienced serious swarm invasions in 1989, 1990, 1993, 1996, 2007 and 2014. In response to the frequent locust attacks, the Government established a Locust Control Centre (LCC) in 1990 by

Decree No. 37/90 for managing and organizing locust operations under the Ministry of Agriculture and Fisheries. The LCC is tasked with monitoring the Desert Locust situation in the Sultanate through regular survey operations to collect relevant data on locust infestations and ecological conditions. It issues regular situation reports in order to keep the national authorities, the regional and international organizations and neighbouring countries informed of locust developments. The LCC maintains and improves the national survey and control systems and prepares and updates the



The building of the Locust Control Centre in Muscat, Oman

national contingency plans. The regular training of staff working on Desert Locust survey and control is another important activity. The objective of the LCC is to reduce the risk that the Desert Locust poses to agricultural production in the country and beyond. The strategy is based on early detection and control when locust numbers start to increase. Consequently, regular surveys in the recession and invasion areas are carried out. This is supplemented by monthly locust reports received from other departments and the local Agricultural Development Centres.



The national locust control programme in Oman

In the past Oman was much depending on information and support received from FAO, CRC and external experts to conduct surveys and organize control operations. Today, the LCC is largely self-sufficient, well equipped with all necessary materials, and is managed by a professional team. The LCC is also operating a well-equipped training centre for survey and control. Technical personnel from the LCC are often mobilized by FAO and CRC as instructors in various training courses held in other countries or regions.

### Saudi Arabia

**S**audi Arabia has attached high importance to the Desert Locust problem for many years because of the high risks that swarms pose to agricultural production. In the early 1960s, a Locust Control Department (LCD) was established in the Ministry of Agriculture, presently the Ministry of Environment, Water and Agriculture, and was responsible for locust control in the Kingdom. The LCD first collaborated with teams from several other institutions such as the British Locust Research Centre, the Sudanese, Egyptian, Pakistani and Jordanian governments, FAO and DLCO-EA. These teams operated under the supervision of the LCD supported by the FAO International Desert Locust Control

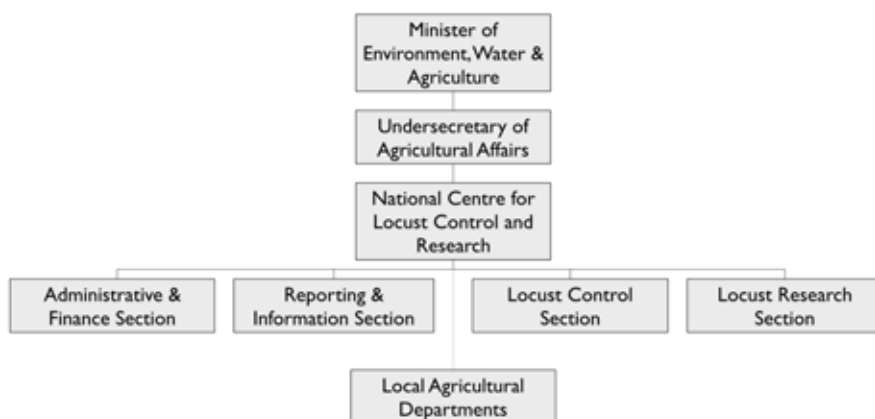


The National Centre for Locust Control and Research in Jeddah, Saudi Arabia

©LCD-SA



Centre in Jeddah. This external support continued until 1965 when the Kingdom took over full responsibility for locust survey and control issues using its own locust control equipment, materials, vehicles and staff. The name of the department was then changed to the Agricultural Research Centre in the Western Region, based in Jeddah. In addition to locust survey and control, the centre was assigned to undertake agricultural research in the field of plant protection. In 1993, agricultural research was split from locust control and a separate Locust Research and Control Station was established. This station continued operating until 1996 when it became the Desert Locust Control Centre and then was renamed as the National Centre for Locust Control and Research (NCLCR) in 2002, responsible for locust survey, control and related research. The NCLCR is a largely autonomous institution with its own budget. It is considered as one of the autonomous locust centres acknowledged by FAO and CRC.



The national locust control programme in Saudi Arabia

Since the early days, locust control operations have relied on proper survey operations and careful monitoring of ecological conditions, but approaches and techniques have evolved over time. In the past, field observations were recorded by hand on paper, and compasses were used to locate the infestations and reproduction areas. The communication of field observations to the nearest station was difficult. Telephone lines to pass the information from the field station to the centre were scarcely available. This was very critical in the event of a swarm invasion and, as a result, control operations often started too late to be effective. In the 1990s, GPS was introduced to locate infestations more precisely and to guide the control teams to the correct location.

In 2000, FAO introduced the eLocust technology and later improved it by which field data could be transmitted directly via satellite to the information office at the NCLCR and on to DLIS in Rome. In addition, mobile phones are now used to ensure communication between the teams in the field. These new techniques have significantly helped to apply the preventive control strategy by developing a more accurate picture of the locust situation much faster and by launching better targeted and early control operations to treat local outbreaks and incoming swarms.

The Government not only attaches high importance to technical matters that help to combat locusts, but it also gives high priority to staff training and human capacity building. In the 1960s and 1970s, many national technicians were sent to the British Anti-Locust Research Centre in London for training. Thereafter, EMPRES/CR and CRC contributed to the qualification of locust staff, whether long-term or short-term, at national, regional and international levels, in addition to regular technical workshops that are organized in the region. The fruitful cooperation between NCLCR, FAO and CRC in the field of staff development and technical advances in locust management has a long tradition and still continues.

### **Somalia**

**S**omalia harbours important Desert Locust winter breeding areas along its northern coastal plains on the Gulf of Aden that extend from the Djibouti border to Berbera and then continue further east to Bosasso. The eastern portion contains relatively small and limited areas that are suitable for Desert Locusts. Breeding can also occur on the interior plateau between the coastal escarpment and the Ethiopian border during the spring and occasionally in the summer but this normally only takes place during upsurges and plagues. Winter breeding, on the other hand, occurs nearly every year, similar to the countries along both sides of the Red Sea. Consequently, Somalia has been the source of several Desert Locust upsurges in the past. The last major outbreak occurred in 2007 and spread to Ethiopia and northern Kenya.



The building of the Directorate of Agriculture at the MoA in Hargeisa, northern Somalia

Somalia is a member of DLCO-EA but has not yet joined CRC. Given the importance of its location in the Desert Locust breeding belt from where locusts can spread easily to Djibouti, Ethiopia, Eritrea and Yemen, CRC in coordination with DLCO-EA and FAO supports national efforts to monitor the locust breeding areas in northern Somalia. This forms an integral part of the regional Desert Locust preventive control strategy as applied in the Central Region and the Horn of Africa.

The civil war of the 1980s left the country's locust survey and control capacity severely damaged and the DLCO-EA base in Hargeisa was destroyed. Since 1991, northern Somalia has no internationally recognized government and is capable of only very basic plant protection activities with one locust officer based at the Ministry of Agriculture (MoA) in Hargeisa. With initial support from FAO, followed by the EMPRES/CR Programme and later from CRC, locust surveys have been conducted on nearly a regular basis during the past 20 years. In cooperation with DLCO-EA, a local information network has been established in the breeding areas in which 20 private radio operators report to the DLCO-EA office in Hargeisa and to the MoA rainfall

and locust observations that are collected from local travellers and nomads. If swarms or large hopper bands develop in northern Somalia, then DLCO-EA undertakes aerial control operations. Whenever possible, biopesticides are used during such operations because it is difficult to organize sufficient ground support to ensure proper application and treatments are often undertaken in pasture areas where livestock are present. A limited stock of biopesticides is maintained in Hargeisa for ground control operations.

EMPRES/CR and CRC have provided various survey and control equipment to the Desert Locust office in Hargeisa such as HF radios, computers, motorized backpack and handheld ULV sprayers, GPS devices, compasses and eLocust data loggers. The MoA locust officer and the DLCO-EA caretaker based in Hargeisa have been thoroughly trained while on the job and in regional training courses. DLIS provides advice on the timing, duration and locations of surveys. Until the current situation improves in northern Somalia and in view of its strategic importance for locust plague prevention in the region, it will be necessary for CRC and FAO to continue their support, in collaboration with DLCO-EA, of survey and control operations as well as strengthening national capacities in a sustainable manner.

## **Sudan**

**S**udan considers the Desert Locust as a pest of high national concern because locust swarms can destroy crops, forests and rangelands and can cause famines as has happened in the past. Desert Locust breeding habitats cover a vast zone of about 1.5 million km<sup>2</sup>. The largest area is the summer breeding belt, stretching from the Chad border to the edges of the Red Sea Hills. It covers nearly ten states: North and West Darfur, North and West Kordofan, White Nile, Khartoum, Kassala, River Nile, Northern and part of the Red Sea State. The winter breeding area is comparatively much smaller, but perhaps of greater importance. It covers the Red Sea coast from Eritrea in the south to the Egyptian border in the north and includes subcoastal areas of the Nubian Desert in northeast Sudan.



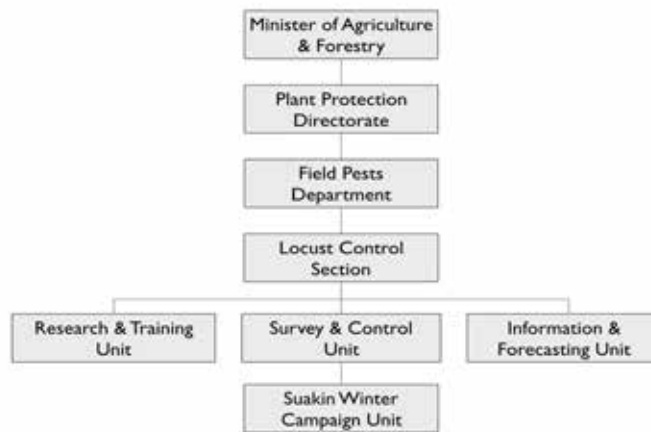
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The Locust Control Section located at the Plant Protection Directorate in Khartoum North, Sudan

Plant protection in Sudan was established when the Anglo-Egyptian colonial government faced a Desert Locust problem that threatened agriculture production and stability of the country. It first started in 1904 as an agriculture research unit to control the Desert Locust. In 1907, the Locust Destruction Act called on persons to assist in the fight against locusts. Authorized persons could enter any land to kill the locusts by ploughing, digging pits, burning scrub brush or any other means. Locals were called upon to assist in this destruction and if they neglected to do so, they could be fined or imprisoned. It was the duty of everyone who saw a swarm, hoppers or

egg-laying to report to the local sheikh, omda or police officer, giving the full details of the location and time of sighting, the size of the swarm and flying direction, and the size and age of the hopper bands. Any person who did not give such information was liable for a fine, imprisonment up to one month, or both. Similarly, sheikhs and omdas had to pass this information on to the nearest police station or they would be punished, too. Locals were also instructed to accompany Government officials to locations of locust infestations. Any offences under this act were triable by court. This was an early example of the importance of information and involving locals in locust reporting and control.

In 1940, crop protection activities were overseen by the Entomology Section of the Agriculture Research Corporation (ARC) in Wad Medani and were entirely focused on locust control. ARC gradually assumed more and more other plant protection tasks that eventually led to the establishment of the Plant Protection Department (PPD) in 1970, which became a Directorate in 1974. Since 1961, PPD has been based in Khartoum North. Within the PPD, the Locust Control Section (LCS) assumes responsibility for all locust matters, particularly Desert Locust issues.



The national locust control programme in Sudan

The LCS operates four technical units: information and forecasting, survey and control, research and training and a winter campaign field unit in Suakin on the Red Sea coast. The information and forecasting unit is responsible for collecting locust, ecological and weather information, for data processing and analysis, and for reporting such as the preparation of monthly national Desert Locust Bulletins. It must keep the Federal Ministry of Agriculture and Forestry (MoAF) and all other stakeholders regularly informed of locust developments and the status of control capacities of the LCS. The survey and control unit is tasked with planning, implementation and evaluation of survey and control operations and keeps a record of the available resources. The research and training unit ensures regular training of plant protection personnel in the MoAF and local governments on locust survey and control. It also plans and initiates field trials on relevant topics for improved locust management in collaboration with the national research institutions.

The Suakin field station serves as base on the Red Sea coast during the winter season for monitoring coastal and sub-coastal breeding areas and undertaking locust control operations whenever necessary.

Since its inception, FAO has supported Sudan in locust control by providing technical advice and introducing new technologies. In 1967, Sudan became a member of CRC and engaged in a more coordinated regional Desert Locust management. Thirty years later, the country became an active partner within the EMPRES/CR Programme. EMPRES/CR was very effective in organizing how Desert Locust operations should be conducted in each country and contributed to reducing the risk of locust outbreaks and upsurges and their impact on the national economy of Sudan.

Until the mid-1990s, locust information was collected and analysed by hand and reports transferred by post and later by radio or fax. With the support of EMPRES/CR and CRC, and in close collaboration with DLIS, GPS technology was introduced followed by eLocust. The staff of the information and forecasting unit became more acquainted with using remote sensing products and in operating the RAMSES GIS. There were many other benefits of this collaboration such as assistance in upgrading control equipment and undertaking joint cross-border surveys on the Sudanese-Egyptian border.

The staff of the LCS profited much from the numerous training programmes on survey methodologies, ULV pesticide application technologies, locust data and pesticide stock management, and environmental impact monitoring of control operations. Sudan also benefited from the support provided by EMPRES/CR and CRC to many research studies and to the Desert Locust Management Diploma course at the University of Khartoum. Consequently, locust survey and control operations have improved over time in Sudan and the main objective of protecting crops and pasture from locust damage has largely been achieved.

## **Yemen**

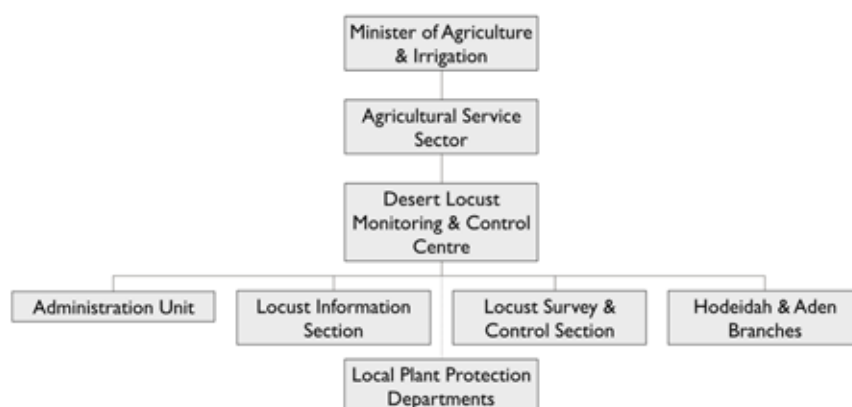
**Y**emen started Desert Locust control in the early 1950s with very basic means. Control operations were based on mechanical control such as digging trenches, the use of fire and collecting adult locusts for food. As a result, the impact of the control efforts remained marginal and frequent invasions of locust swarms and the threat to agricultural production remained a major public concern. Subsequently, more effective means were introduced to control locust swarms, replacing mechanical control more and more by chemicals, initially by spreading dusts and poison bait by hand on hopper bands and groups.



The Desert Locust Monitoring and Control Centre in Sana'a, Yemen



During the mid-1970s and early 1980s, control operations became more effective as a result of the establishment of CRC. Vehicle-mounted exhaust nozzle sprayers and the ULV application technology were introduced. Better organized control operations started to take shape when an upsurge or a series of major locust outbreaks occurred in Yemen where immature and mature swarms were reported at times from the late 1970s to the mid 1980s. In these years, locust control was mainly organized and carried out by the individual Plant Protection Directorates of the two Yemens, the People's Democratic Republic in the south and the Yemen Arab Republic in the north. It was only after the unification of the two states in 1990 that a semi-autonomous locust control centre was established by the united Yemeni Government under the Ministry of Agriculture and Irrigation.



The national locust control programme in Yemen

The Desert Locust Monitoring and Control Centre (DLMCC) started operating in 1990 with a survey and control section in Sana'a and field extensions in Hodeidah and Aden. In addition, the DLMCC cooperates with the plant protection departments at the agriculture offices of the local governorates. Since the early 1950s, FAO and later CRC provided many opportunities for improving the skills of national locust control personnel in Yemen. But it was only with the EMPRES/CR Programme that the country's capacity to respond to locust outbreaks and invasions substantially improved.

The DLMCC benefited from intensive staff training on the use of modern application technologies, improved survey methods, and locust data management. EMPRES/CR provided advanced equipment for survey and control operations, stimulated bilateral cooperation through exchange of experience and supported joint cross-border surveys between Yemen and Saudi Arabia. In this period, elements of a more proactive preparation and organization of locust management were taken into consideration.

In particular, early surveys in the locust breeding habitats became routine and the movements of swarms were closely watched in other countries of the region, through the exchange of information with neighbouring countries and close collaboration with DLIS. It was also in this period that the DLMCC introduced locust risk reduction procedures through contingency planning and started preparing its national

contingency plans built on the likelihood of locust activities in the next period and on the available resources to assess the possible impact and operational gaps. Compared with the 1980s, these developments represented tremendous advances in boosting the capacities of the DLMCC and its significance for disaster risk reduction and the impact on food security in Yemen but also in the neighbouring countries, which is highly recognized.

FAO, EMPRES/CR, CRC and the donor community have always played an important role in supporting Yemen through capacity building and in particular brokering emergency assistance, and providing technical and logistical support during locust outbreaks and upsurges. Their support was crucial in maintaining food security in Yemen, for example, during the Desert Locust upsurge 2003–2005, the serious outbreaks in 2007 and again in 2013–2014, and rehabilitating the DLMCC premises in Sana'a after it had been looted and severely damaged as a result of the events in 2011.

The cooperation between the DLMCC, FAO and CRC remains indispensable in ensuring that the national locust programme continues to operate and sufficient Desert Locust control capacities are maintained not only for the benefit of the nation but also for entire region.

## **4.2 Invasion countries**

### **Bahrain**

**B**ahrain is more at risk from receiving incoming Desert Locust swarms than it is providing areas suitable for Desert Locusts to breed. But the unpredictable nature of locusts and their high mobility represent an economic danger to agricultural production in the country. In the past, Bahrain was often subject to locust invasions. Locust swarms covered the skies over Bahrain in 1928 and in 1953 when locust swarms damaged date palm plantations. In those days, there were no appropriate means available for controlling the infestations other than people hunting locusts for human consumption.

The Government became aware of the need for appropriate measures to keep damage caused by swarms to a minimum. As the Desert Locust does not recognise political boundaries, efforts were required to create regional cooperation. This was achieved with the establishment of CRC.



The Ministry for Works, Municipalities and Urban Planning in Manama, Bahrain

© PPQD-Bahrain

The Plant Protection and Quarantine Division (PPQD) of the Plant Wealth Directorate in the Ministry for Works, Municipalities and Urban Planning responsible for the agricultural sector is nowadays entrusted with locust control operations. The Pest Control Group of PPQD is tasked to conduct surveys and to carry out control operations when required. Its survey and control teams operate according to the guidelines issued by FAO. These teams have been able to improve their skills by attending training courses organized by CRC. Although Bahrain has not been threatened by Desert Locust swarms in recent years, the PPQD staff has gained good experience in dealing with this dangerous pest. A special Agricultural Sector Committee representing all governmental departments developed a management plan for the event of a locust invasion. When alerts are issued, it is expected that certain procedures in this plan are applied rapidly and that they are well coordinated with other relevant government institutions.

The good relationship between the PPQD and CRC has been important in strengthening national capacities in combating locusts. Bahrain is kept informed of the locust situation and receives early warnings through the monthly FAO Desert Locust Bulletins issued by DLIS. This is vital in the decision-making process and allows rapid reaction in the event of possible locust invasions. Bahrain has also gained from many different activities organized by CRC such as workshops and training courses that have helped to provide the technical staff with the necessary skills in various areas of locust operations. Bahrain has received important publications and reference materials and has benefited from a number of ULV sprayers provided by CRC.

These contributions are only some examples of the direct support received from CRC. More important are its efforts to strengthen and improve the early warning and rapid response systems in the frontline countries that contain important outbreak areas. Bahrain and all other invasion countries in the region are benefiting indirectly from this regional cooperation in preventing locust plagues. Thanks to the combined efforts of all the member countries of CRC, the Kingdom of Bahrain has been kept safe from the locust danger for decades. This is an enormous achievement by CRC and is highly appreciated.

### **Iraq**

**I**raq is known in historical accounts as Mesopotamia, the land between the Tigris and Euphrates rivers that cross the country from the north to the Shatt al Arab in the south. In this area, the first human civilizations emerged and the first urban centres were created about 8 000 years ago. The Tigris and Euphrates rivers and their tributaries are the basic resources of Iraq. They have provided fresh water for



The Plant Protection Office in Baghdad, Iraq

its citizens, agriculture and animal husbandry for thousands of years. According to 2013 statistics, the total area of agricultural land is about 180 000 km<sup>2</sup>, equivalent to 40 percent of the entire area of the country. The principal agricultural crops are wheat, barley, maize and dates. Agriculture in Iraq is the second most important pillar of the national economy after oil.

The Ministry of Agriculture (MoA) promotes sustainable agricultural development in order to achieve self-sufficiency. To secure the harvests, the MoA pays close attention to plant protection against all pests and diseases. It is for this purpose that agricultural directorates have been established in all provinces. They play a pivotal role in monitoring agricultural production and in ensuring the provision of chemical fertilizers and pesticides. The Plant Protection Division (PPD) of the MoA is responsible for the supervision of the work of the Agricultural Directorates in the provinces.

The Desert Locust is considered as one of the most important threats to crop production in Iraq. Locust swarms have invaded Iraq in 1890 and at least several times every decade between 1910 and 1960. It was these experiences that the Iraqi Government was highly motivated to join CRC after its establishment in 1967. Iraq hosted the first session of CRC in Baghdad on 1–4 February 1969, participated actively in many of the subsequent sessions and contributed to its Trust Fund. In addition, Iraqi locust officers joined control operations in the Arabian Peninsula in 1977, and also served as the Chairperson and Vice Chairperson of CRC in many of its sessions.

In recent years, Iraqi locust officers and technicians have participated in many events organized by CRC, such as subregional training courses to qualify national staff on the basic principles of Desert Locust survey and control. PPD staff have also benefited from regional workshops on the maintenance of control equipment, and sent officers to register in the Desert Locust Management Diploma course organized at the University of Khartoum. The investments in human capacity building are much appreciated by the Government and it is therefore highly interested in continuing participation in all events offered by CRC.

Although Iraq is considered as an invasion country that does not have seasonal locust breeding areas, CRC has supported the improvement of Iraq's preparedness level in case of swarm invasions. The locust situation in the Central Region and other regions is watched closely through the monthly FAO Desert Locust Bulletins in order to identify new developments early enough and to take the necessary countermeasures when needed.

## **Jordan**

**J**ordan was frequently a victim of locust invasions in the past. In 1935, the first organized control operations were carried out in the Kingdom when locust swarms invaded and caused severe losses to crops. The Prime Minister at that time issued a decree ordering all citizens over the age of 13 to participate in collecting locust egg pods, digging trenches and carrying out control through burning.



The Plant Protection and Phytosanitary Directorate is located at the Ministry of Agriculture in Amman, Jordan

Today, Desert Locust survey and control operations are organized by the Plant Protection and Phytosanitary Directorate (PPPD) in the Ministry of Agriculture (MoA). By law, the MoA is fully responsible for migratory pest control and provides all necessary resources such as qualified staff, equipment and pesticides. It develops plans to address locust emergencies and coordinates the efforts of all national institutions involved in control operations. The Kingdom is divided into territories based on the likely routes of incoming swarms from neighbouring countries.

In recent years, the MoA has created special units, well equipped with the necessary materials including vehicles, to monitor locusts in the areas near the northern and southern borders. One of the main entry points of locust swarms into the Kingdom is the southern area bordering the Red Sea and Saudi Arabia.

In order to minimize the risks of accumulating obsolete chemical pesticides and to avoid prolonged storage periods, the MoA has entered into an agreement with local pesticide manufacturers to deliver pesticides quickly when they are actually needed. The contracted companies are obliged to carry out quality analysis and to take back all excess supplies to be reformulated.

The Kingdom was one of the first countries that realized the need for regional cooperation in the fight against the Desert Locust. Jordan is considered an invasion country that does not harbour any seasonal locust breeding habitats, but it can easily be affected by invading swarms arriving from the frontline countries. Therefore, Jordan played an active role in creating the regional locust commission with the objective of providing support to its member countries in the fight against this transboundary threat.

In the past decades, CRC fulfilled many of its original expectations. Through its website and in collaboration with DLIS, CRC makes sure that Jordan is informed and aware of locust movements in the countries that have seasonal breeding areas. CRC has organized several regional and subregional training courses. So far, more



than 100 agricultural engineers from Jordan have benefited from such opportunities. Jordanian pilots and technicians were able to improve their technical skills in regional workshops on aerial spraying and engineers profited from special workshops on the maintenance of spray equipment.

In 2013, Jordanian staff were given the opportunity to participate in joint surveys and control operations during the locust campaign in Saudi Arabia. Scholarships were provided for students to attend the Desert Locust Management Diploma course organized at the University of Khartoum. In 2013, CRC contributed to the establishment of an emergency operation office in Jordan equipped with all the necessary devices to ensure communication with all governorates during locust emergencies.

## **Kuwait**

**K**uwait considers the Desert Locust as one of the most dangerous locust species for all crop producers in the region. The countries threatened by locust plagues realized long ago the importance of combating this transboundary pest and welcomed the initiative of FAO to promote regional cooperation by establishing a special commission for controlling the Desert Locust in the Near East.



The Department of Pest Control and Quarantine at the Public Authority of Agriculture Affairs and Fish Resources in Kuwait

The fact that Kuwait was one of the first countries to become a member of CRC confirms the importance the Government attaches to this concept of cooperation developed by FAO. The strategy of plague prevention has been proven to work in recent decades by preventing impact of this pest on people's livelihoods in the country.

The ecological conditions in Kuwait are generally not suitable for locust breeding, but the country has experienced several swarm invasions in the past. In 1944, locust swarms darkened the sky and in 1964 people collected locusts in bags to sell them in the markets for food. Despite the fact that Kuwait is not a frontline country, it should always be prepared to act immediately against possible locust invasions.

The Department of Pest Control and Quarantine (DPCQ) of the Public Authority of Agricultural Affairs and Fish Resources is responsible for monitoring Desert Locust movements and activities in Kuwait, and coordinates and supervises control operations with local authorities when required. The DPCQ provides the necessary equipment

and pesticides to the local teams. The plant protection personnel have been trained on how to conduct surveys and to carry out control campaigns through the many training courses organized by CRC.

The Government of Kuwait is aware of the negative impact locust control operations may have on human health and the environment and welcomes the efforts of CRC to minimize these effects through proper handling and use of pesticides before, during and after control campaigns. From this standpoint, Kuwait encourages CRC to further support such measures at the national and regional levels by promoting the use of biopesticides and monitoring the impact of control operations.

## **Lebanon**

**L**ebanon has no suitable Desert Locust breeding habitats and is thus classified as a country that may be invaded by Desert Locust swarms during upsurges or plagues that originate from the frontline countries. Lebanon has often been the victim of locust swarms in the past. Small groups of adult locusts last arrived on Lebanese territory in March 2013. Swarms also invaded the country during the locust upsurge of 2003–2005.

The Plant Protection Department (PPD) of the Ministry of Agriculture is responsible for locust and other pest control. In case of locust invasion, the PPD together with the agricultural offices in the governorates coordinates locust surveys and organizes control operations when required.



The Plant Protection Department at the Ministry of Agriculture in Beirut, Lebanon

Lebanon was actively involved in the establishment of CRC. It was one of the founding members of the Commission and hosted the FAO Special Meeting in which the establishment agreement was discussed in March 1965. It was also the first country to sign the convention. In addition, Lebanon has hosted several of the periodical CRC sessions and provided the chairperson. In the past 50 years, CRC has contributed substantially to safeguarding agricultural production against the Desert Locust and has encouraged its member countries to pursue a preventive control strategy. CRC has supported and assisted its members in conducting regular field surveys in accordance with the standard operating procedures in order to detect early locust infestations and to perform timely control operations while minimizing human health and environmental risks.

Lebanon has benefited a great deal from its participation in CRC, particularly in improving human capacities to manage locust campaigns and to coordinate efforts in the event of locust invasions. In recent years, plant protection officers from Lebanon have participated in nine subregional training courses organized by CRC,

in an interregional ToT workshop conducted in Iran in 2010, in a regional sprayer maintenance workshop in Egypt in 2014 and in a subregional training course on locust survey and control in Oman in 2015.

In addition, Lebanon has also benefited from various publications issued by FAO, EMPRES/CR and CRC, such as the Desert Locust Guidelines, the SOP series and the Desert Locust Glossary. Lebanon is regularly being kept informed of the locust situation in the region by DLIS and the monthly FAO Desert Locust Bulletins. These timely situation updates are highly acknowledged.

## **Qatar**

**Q**atar was one of the first members of CRC and attended Commission sessions regularly. But locust management structures only started to take shape after the Desert Locust upsurges in the 1990s. As a result, the Government established a permanent locust defence system based on regular surveys and reporting. The Division of Plant Protection and Quarantine (DPPQ) of the Department of Agricultural Affairs in the Ministry of Municipality and Environment conducts regular locust and grasshopper surveys throughout the year and collects data to assess the situation. Control operations, when required, are carried out by specialized teams of the DPPQ using ULV sprayers.



The Division of Plant Protection and Quarantine at the Ministry of Municipality and Environment in Doha, Qatar

During recent decades, Qatar did not experience Desert Locust invasions, but during surveys has frequently observed African Migratory Locust infestations. For many years, it routinely repairs and maintains the spray equipment prior to the rainfall season in order to be ready to react immediately once locust infestations are reported.

FAO and CRC supported two national training courses in Qatar and sponsored the participation of national plant protection officers in several subregional and regional Desert Locust training courses. In total, about 50 national officers have benefited so far from those opportunities.

In 2013, CRC also facilitated the participation of one plant protection staff member from Qatar during the locust campaign in Saudi Arabia. CRC has provided Qatar with all the relevant Desert Locust publications, plus one FAO Desert Locust Master Trainer Manual and kit, as well as spray equipment and the monthly FAO Desert Locust Bulletins translated into Arabic.

## Syria

Syria suffered from many Desert Locust swarm invasions in the past that have caused heavy crop losses in 1833, 1890, 1912, 1919, 1964, and 1965. In response to those attacks, the Government was keen in joining CRC in 1968 to enable, in cooperation with the neighbouring countries, regional coordination of locust control measures. Since the establishment of CRC, Syria has actively participated in its sessions.



The Plant Protection Department at the Ministry of Agriculture and Agrarian Reform in Damascus, Syria

The Plant Protection Directorate (PPD) of the Ministry of Agriculture and Agrarian Reform (MoAAR) is responsible for Desert Locust control operations in the country. Syria is classified as an invasion country. When environmental conditions become suitable in frontline countries such as Sudan, Egypt and Saudi Arabia and major upsurges or plagues occur, locust swarms can reach Syrian territory. The MoAAR takes all necessary measures to protect crops from harmful pests such as locusts because the agricultural sector is the basis of the national economy. The Ministry has developed a national plan to counteract swarm arrivals from neighbouring countries. The PPD monitors the Desert Locust situation, in cooperation with other national authorities, by conducting surveys particularly in the desert areas after periods of rainfall and the growth of green vegetation. The MoAAR also operates a well-equipped aerial spraying unit that can be mobilized for locust control.

Syria has benefited from the cooperation between MoAAR and CRC in many aspects such as support to national training courses of locust control personnel and participation in several regional training events and workshops on special issues such as the operation and maintenance of the control equipment. Agricultural pilots from Syria twice attended training courses on aerial spraying of locust infestations convened by CRC in cooperation with DLCO-EA. CRC also granted two Diploma/M.Sc. scholarships to national technicians at the University of Khartoum. These short and medium-term training programmes helped the PPD personnel to improve their knowledge and skills. For information exchange, PPD highly appreciates the monthly FAO Desert Locust Bulletins issued by DLIS and translated into Arabic by CRC. In return, PPD keeps CRC and FAO informed of the locust situation in Syria.

Regional cooperation and support coordinated by CRC has had a significant positive impact on the plague prevention system as a whole and the way that control operations are nowadays being conducted.

## United Arab Emirates

**T**he United Arab Emirates contains vast areas of dry desert lands and lacks substantial rainfall regimes. Invasions of Desert Locust swarms are therefore relatively rare events. Only small swarms of Desert Locusts arrived in June 2008 from the spring breeding areas in Saudi Arabia. Again in May 2014, some infestations along the border with Oman were controlled before causing damage in cultivated areas.



The Plant Health and Agricultural Development Department at the Ministry of Climate Change and Environment in Dubai, United Arab Emirates

The United Arab Emirates has been classified as an invasion country because it is threatened by locust attacks only occasionally. As a result, the Government did not consider that establishing a special national locust control unit was critical to combat this pest. After the creation of the United Arab Emirates, the Federal State participated, in line with the goals of the international institutions, in efforts to achieve food security. In this context, the United Arab Emirates pays special attention to the possibility of locust attacks. An operational plan has been prepared to ensure good coordination of control activities between the federal governmental agencies and the governorates.

Locust matters including control operations have been entrusted to the Plant Health Division (PHD) of the Health and Agricultural Development Department at the Ministry of Climate Change and Environment. The PHD coordinates locust survey operations with the relevant local authorities in the governorates and initiates precautionary measures when serious developments occur. To anticipate these, the PHD remains in permanent contact with DLIS and the Secretariat of CRC.

The United Arab Emirates has benefited directly and indirectly from CRC, for example through national and subregional training courses on Desert Locust management. Several plant protection officers from PHD and also technicians from other relevant agencies have participated in the various activities organized by CRC. National technicians have also gained practical experience from various field visits to frontline countries when actual control operations were being conducted. The United Arab Emirates participates in the regular CRC sessions and hosted the 29<sup>th</sup> session in Dubai on 23–27 November 2014.



## 5. Anecdotes



### **My first experience in the field of locust survey and control**

*by Fuad Bahakim (Yemen)*

I started my career in the fight against the Desert Locust in South Yemen in May 1978 at the Locust Control Section of the Ministry of Agriculture and Agrarian Reform in Aden. Two months later, I was already ordered to check the locust situation in the Shabwa Province, though I had no idea of locust survey or control and had not received any instructions. This was not unusual, as a systematic and standardized way of conducting surveys and recording field observations did not yet exist in those days. Naturally, the data collected differed greatly from person to person and the data transmitted via radio from the field to the Locust Section in Aden were full of errors. Consequently, the reports sent to the Locust Research Centre in the United Kingdom, the institution that issued the monthly Desert Locust bulletins in those years, were not always reliable.

Equally, control of the locust infestations was far from easy and perfect. It was done by hand, using manual dusters or poison baits without any personal protection equipment. I still recall how hard the work was during the plague years in the late 1980s, carried out under harsh conditions with only one driver and one technician to help. Despite all the difficulties, we were able to protect the nearby agricultural cooperatives from being attacked by locusts. Later we controlled groups of hoppers in the border area between North and South Yemen by using manual dusters. We also trained staff from the agricultural cooperatives on the use of baits, and taught soldiers how to use the dusters.

When we returned back to base, the Head of the Locust Section called me into his office to give him the campaign report. He was deeply impressed by the details and was amazed to learn how tough it was to undertake locust control work in the field. Usually the results of control operations were not documented. Only the amount of pesticides used served as an indication of success. I was rewarded for my work by being invited to join the Locust Section Head on his mission to Rome to attend the 22<sup>nd</sup> session of the DLCC in July 1978. The same year I accompanied him to the ninth session of CRC held in Baghdad in December. That was the first time I came in touch with CRC.

This was the beginning of my journey in the fight against the Desert Locust. I have come a long way and came to know and appreciate many colleagues from the other CRC member countries and the other locust regions. After the unification of North and South Yemen, I became Director of the national Locust Control Centre in Sana'a and later was recruited by FAO as a National Professional Officer (NPO) responsible

for supervising the locust survey activities within the EMPRES/CR Programme. I was not only lucky to witness many of the advances over the years in Desert Locust survey and control, but I am also grateful for having been given the chance to be directly involved in the introduction of some of the new technologies and approaches the CRC member countries are benefiting from today.



### **Ambushed and lost in the desert**

*by Hayder Hanan Korina (Sudan)*

**M**y work in the area of Desert Locust survey and control in Sudan was always hard and at times like living on the edge. In one of the routine locust surveys we carried out along the Red Sea and in Kassala States during the summer season in September 2013, the survey team and I moved into the area near to the Eritrean border.

At this time, we had received reports of rebels of the opposition forces having entered Sudan from Eritrea with a fleet of about thirty four-wheel-drive vehicles. The Sudanese troops, heavily equipped with all kinds of weapons stood on standby 3 km away, awaiting the rebels. It so happened that we found ourselves in the midst of it all. Unaware of the danger building up we stopped to do our fieldwork, prepared our survey and control equipment and put on our masks and overalls. Suddenly we were surrounded by soldiers of the Sudanese Army. They pointed their weapons at us and gave order to destroy our vehicles. At first we thought they were the rebels, but then I realized they were Sudanese Army soldiers. I immediately told them that we were working for the same Government and were officers from the Locust Control Centre of the Ministry of Agriculture. The magic word was “Locust control” and the tension dissolved. We thanked the Lord for our rescue after we were so close to being shot.

In 2005, we were north of the Red Sea area, undertaking ground control operations with two vehicles in Wadi Diib near the Egyptian border. We stopped and I gave instructions to the first driver and then to the second. When the second vehicle moved on I turned around to find that the first vehicle had already left. So I found myself stranded all alone in a mountainous area with wild animals. I wandered around for about ten hours without food or water, but accompanied by hyenas. When the drivers returned to the camp in the evening, each driver thought that I was with the other vehicle. The drivers were shocked to find out that I was missing and started searching, not for locusts this time but for me. After a long and tiresome search, they eventually found me and rescued me from almost certain death by thirst or being killed by hyenas. And I thanked the Lord for my rescue.

In 1989, we conducted surveys by helicopter in the southern Red Sea area of Karora. It was the first time that helicopters were being used for locust survey in Sudan, but this particular type of aircraft was not yet familiar to the Sudanese Army. We started

surveying the mountainous parts first and continued in the coastal areas. When we arrived at the military camp at Aqiq, the soldiers rushed to their guns and were directed to fire at us. But fortunately the pilot reacted rapidly, touched the ground and ordered us to get off the helicopter as quickly as possible. The soldiers detained us immediately, but after checking our identities they realized who we were and we thanked the Lord for our rescue. Again the magic word was “Locust control”.



### **Facing the challenge**

*by Kassahun Yitafaru Tewodros (Ethiopia)*

**I** came into a closer working relationship with CRC after I was appointed EMPRES/CR Liaison Officer of the Migratory Pest Control Unit of the Ministry of Agriculture in Ethiopia. Although I am an entomologist by profession, I was not familiar with the Desert Locust problem and the activities of the EMPRES/CR Programme. So I had to squeeze myself in and to catch up quickly in order to run and coordinate the national activities in Ethiopia in the context of a regional locust programme.

I was privileged indeed to be received warmly and I enjoyed all the encouragement from my new colleagues. In the process, I could familiarise myself with the regional locust community. After a couple of months, I met the former CRC Secretary who invited me to a regional training course in Cairo on locust survey and information management tools such as eLocust and RAMSES. This opportunity made me more confident in locust work and helped me to interact more confidently with the locust officers from the other CRC member countries.

In 2007–2008, a locust outbreak occurred in Ethiopia together with large locust swarms entering from Somalia, which had not happened in the previous 40 years. In the desperate struggle to control these swarms with aerial support from DLCO-EA, I gained a lot of experience and could improve my professional competence in locust management. It was in this difficult period I came to realize the importance of regional cooperation and of CRC in managing the locust problem in the region. During this emergency, the Locust Control Unit in Ethiopia was much constrained by logistical problems. In this situation, FAO and CRC supported the Locust Unit with emergency assistance, which greatly helped the operations.

During my years with EMPRES/CR and CRC, I much enjoyed the regional partnership, the enthusiasm and the fraternity. I was privileged to experience through the locust work how the world could be made a better place when there is true commitment and cooperation among people and countries.



**And suddenly,  
all was different ...**

*by Tamer Abdel Hamid Abu Qandil (Egypt)*

**D**esert Locust fieldwork requires more skills than just being familiar with the behaviour and life cycle of the locusts, and how surveys or control operations should be conducted. Locust officers must also be capable of withstanding the harsh working conditions in the desert and should be prepared to face sometimes difficult and even dangerous situations. These may be work-related hazards such as vehicle breakdowns in the middle of nowhere and on other occasions they can be accidental exposure to chemical pesticides or a sudden life-threatening incident.

This happened to me in 2013 when I participated in a control operation against hopper bands at the border between Egypt and Palestine. When the Israeli forces spotted us, they started to fire in the air, forcing us to stay away from the heavily infested site. A few days later when we were surveying a nearby area in the northern Sinai Peninsula for locust infestations, a group of insurgents came up and hijacked the driver and me at gunpoint. They ordered us to spray their farm planted with “bango”, a narcotic plant. We quietly explained that the infestation was not important enough to merit control but they insisted. I secretly turned the valve of the vehicle-mounted sprayer to the flushing position and we did them the favour as wanted but spraying diesel instead of insecticides. The hijackers did not notice the trick and eventually released us from our uncomfortable situation.

On another occasion, nomads in southern Egypt furiously opposed any control operations against locust infestations in their area because of fear that their cattle and sheep could be poisoned. After a long debate they accepted, provided that I would compensate them for any losses from my own pocket. Luckily, so far I did not receive any claims.

During a survey in one of the valleys near Marsa Alam on the Red Sea coast, we were well equipped with one scout, GPS devices and all the necessary maps. To our great surprise the area did not match our maps. Even some hills had disappeared and we wondered whether we had gone astray. We were following a long wadi and suddenly we found ourselves in the middle of a huge gold mine. It was the miners who had completely changed the landscape. The security guards of the mine arrested us in order to hand us over to the police but, because we behaved tactfully and we could prove our identity to the mine authorities, we were eventually released and could continue on our way.

In short, locust field officers should always be cautious, have a strong personality and be capable of making quick decisions in critical situations along with having good practical expertise to carry out survey and control operations professionally.

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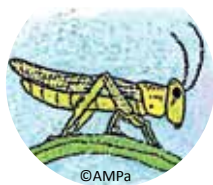
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# **The FAO Commission for Controlling the Desert Locust in the Central Region**

## **A celebration of 50 year of service 1967–2017**

Concerned about the devastating crop losses caused by the Desert Locust, the Food and Agriculture Organization (FAO) of the United Nations started a global programme in the 1950s to fight the recurrent Desert Locust plagues. Affected countries were encouraged to support locust control within their territories and to participate in regional programmes. This initiative led to the establishment of three FAO regional Desert Locust commissions in the vast Desert Locust distribution area of Africa and Asia that covers roughly 20 percent of the Earth's land surface.

As the second regional Desert Locust commission, the Commission for Controlling the Desert Locust in the Central Region (CRC) was established in 1967 under Article XIV of the FAO Constitution. It comprises 16 member states of the Near East and in the Horn of Africa. Its mandate is to promote regional cooperation and coordination and to prevent plagues by strengthening national locust programmes in preparedness, early warning and timely control.

This book was commissioned to commemorate the 50<sup>th</sup> anniversary of CRC. It portrays the long struggle of human mankind against Desert Locust swarm invasions. It explains how scientists eventually understood the mystery behind the suddenly appearing threat and first organized international cooperation in the fight against this dangerous insect pest. The book describes the unique role of FAO as an important global player in promoting early warning systems and environmentally less harmful preventive control practices. It highlights the responsibilities of CRC in raising the capacities of its member states so that Desert Locust plagues will become rarer and less devastating to agricultural production and livelihoods in the region.

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