

**Meeting Report
No. AGP/1990/M/2**

**REPORT OF
THE THIRTY FIRST SESSION OF THE FAO DESERT LOCUST
CONTROL COMMITTEE**

**held in
Rome, Italy
24-28 September 1990**

**Plant Production and Protection Division
Food and Agriculture Organization of the United Nations**

Rome, 1990

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INTRODUCTION

The Thirtieth Session of the FAO Desert Locust Control Committee, which was held in Rome on 12-16 June 1989, agreed that the next Session of the Committee should be held in Rome after approximately one year at a time to be chosen by the Director-General of FAO.

In view of the continued assistance provided by the international community, it was again considered appropriate to involve both DLCC member countries and donors at this particular Session.

The Director-General therefore invited the following Governments to be represented at the Thirty-First Session.

Afghanistan	Libya
Algeria	Mali
Australia	Mauritania
Bahrain	Morocco
Belgium	Netherlands
Benin	Niger
Bulgaria	Nigeria
Burkina Faso	Norway
Cameroon	Oman
Cape Verde	Pakistan
Central African Republic	Portugal
Chad	Qatar
Côte d'Ivoire	Saudi Arabia, Kingdom of
Djibouti	Senegal
Egypt	Sierra Leone
Ethiopia	Somalia
Finland	Spain
France	Sudan
Gambia	Sweden
Germany, Federal Republic of	Switzerland
Ghana	Syria
Greece	Tanzania
Guinea	Togo
India	Tunisia
Iran, Islamic Republic of	Turkey
Iraq	Uganda
Israel	United Arab Emirates
Italy	United Kingdom
Japan	United States of America
Jordan	Yemen Republic
Kenya	
Kuwait	
Lebanon	

He also invited representatives of the following organizations to attend as observers: Desert Locust Control Organization for Eastern Africa (DLCO-EA), Organisation Commune de Lutte Antiacridienne et de Lutte Antiaviaire (OCLALAV), International Red Locust Control Organisation for Central and Southern Africa

(IRLCO-CSA), United Nations Development Programme (UNDP), World Meteorological Organization (WMO), International Fund for Agricultural Development (IFAD), African Development Bank (ADB), Islamic Development Bank (IDB), Economic Commission for Africa (ECA) and the Inter-African Phytosanitary Council (IAPSC) of the Organization for African Unity.

The Session was opened by Mr. L. Brader, Director of the Plant Production and Protection Division (AGP) and of the Emergency Centre for Locust Operations (ECLO), who on behalf of the Director-General welcomed the participants to Rome. He reminded participants that the DLCC was the most important committee at the international level concerned with technical aspects of Desert Locust control. He noted that the current situation was relatively calm although there had been reports of gregarious populations in Pakistan. He thanked the international community for responding so generously to the appeals for assistance from the Director-General which contributed to the termination of the recent plague. Although the situation was quiet it was now time to strengthen the survey and control capacities of national units, to improve survey and control techniques and to undertake further basic and applied research on the ecology of the Desert Locust and, on chemical and biological control of the Desert Locust. Greater attention would have to be given to effects on the environment. FAO and UNDP had established a Scientific Advisory Committee (SAC) to review research proposals submitted to it. FAO recognised that the key to the long-term suppression of the Desert Locust lay in preventive control and was developing an inter-regional preventive control project in West and North West Africa which would be submitted to the affected countries, and to the donors for financial support.

Officers of the Session

Chairman: Mr. Muhammad Shafi (Pakistan)
Vice-Chairman: M.T. Ben Halima (Morocco)

Drafting Committee

The Drafting Committee was made up of the delegates of Morocco, Niger, Saudi Arabia, the United Kingdom, the FAO Regional Locust Officers and the Secretariat. Mr. L. McCulloch acted as Technical Secretary.

Obituary

The Committee regretted the deaths of M. Jean-Marie Castel, who had been associated in particular with OCLALAV for over twenty years, of M. Soumana Sounera, Director of the Plant Protection Service of Mali from its creation, and of R.C. Rainey, F.R.S. of the Desert Locust Survey in East Africa and later with the Anti-Locust Research Centre and Centre for Overseas Pest Research, who made the important discovery that Desert Locust swarms moved downwind.

Acknowledgements

The Chairman thanked the Director-General of FAO, Mr. Brader, and the FAO staff for the arrangements which had been made for the meeting, which had facilitated open discussions. He also thanked the affected countries and the international donor community for the close collaboration which continued after the decline of the plague.

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AGENDA

1. Opening of the Session
2. Election of the Chairman and Vice-Chairman
3. Adoption of the Agenda
4. Election of the Drafting Committee
5. The Locust Situation June 1989-August 1990 and Outlook to December 1990
 - (a) Desert Locust
 - (b) Other species
6. Control Measures Undertaken
7. Review of Existing Control Potential
8. Assistance Provided to Countries and Regional Organizations
9. The International Desert Locust Task Force
10. Report of Technical Advisory Committee on Desert Locust (Rome, June 1990)
11. Report of UNDP/FAO Scientific Advisory Committee on Desert Locust Research (Rome, March 1990)
12. Medium Term Project for Preventive Control of Desert Locust in West and North-West Africa
13. Desert Locust Research
 - (a) Insect Growth Regulators
 - (b) Biological Control
 - (c) Dieldrin Alternatives
 - (d) ULV Application Methods
 - (e) Pesticide Drift
 - (f) Pesticide Stocks
14. Training
 - (a) Review of current programmes
 - (b) Recommendations for future training
 - (c) Coordination
15. International Trust Fund 9161: Contributions and Expenditure
16. Status of Regional Locust Commissions and Organizations
 - (a) Near East Commission
 - (b) North-West Africa Commission
 - (c) South-West Asia Commission
 - (d) DLCO-EA
 - (e) OCLALAV
 - (f) IRLCO-CSAand follow-up of recommendations made at their annual meetings
17. Any Other Matters
18. Date and Place of Next Session
19. Adoption of the Report

SUMMARY OF DISCUSSIONS

THE LOCUST SITUATION JUNE 1989-AUGUST 1990 AND OUTLOOK TO DECEMBER 1990

I. DESERT LOCUST

General

1. The plague which terminated in early 1989 did not return despite the presence of favourable ecological conditions throughout much of the summer breeding area in 1989. An upsurge in spring breeding areas in Oman and south-eastern Iran in April-June 1990 was followed by the appearance of several swarms in Baluchistan and Tharparkar in Pakistan and of hopper bands in Tharparkar. These were controlled by mid-August.

The main features

2. In West Africa the southern circuit swarms produced in late 1988 which traversed Mali and Burkina Faso in May 1989 dispersed, apparently without laying.

3. Other populations which overwintered in the traditional summer breeding area in the Sahelo-Saharan zone did mature with the advance of the Inter-Tropical Convergence Zone (ITCZ) in July 1989. Although there were widespread and good rains in July and early August leading to flooding in north-western Adrar des Iforas there were no reports of gregarizing breeding from Mauritania, Mali, Niger or Chad up to September. Later in the season, small hopper infestations did develop in Tamesna in Mali and Niger and north of Menaka in Mali. Small scale control was undertaken in late October in Mali and in December in Niger.

4. In 1990 the situation in the Region has been generally calm. Small numbers of adults were seen in Mauritania in March and in Mali in April. However, the presence of reddish locusts near Aioun el Atrouss in the last decade of July indicates that undetected gregarious breeding must have occurred during the late spring, possibly further north in Mauritania. There were further reports of adults in the Nema and Aioun areas in August and one of hoppers near Aioun. In Mali scattered adults were seen in the Tilemsi and the Gourma in late July, and in August scattered adults and hoppers were reported in the Gourma and in the Lac region. In Niger scattered adults were seen in Air in July; in one locality they were laying. In August scattered adults were seen at one locality in Tamesna. There have been no reports from Chad, Burkina Faso or Senegal.

5. In North-West Africa there were just two reports from Morocco during the reporting period, one of scattered adults south-west of Tan Tan in January and the other of scattered adults near Errachidia in February. In Libya groups of fledglings at densities of 250-300/ha over 3833 ha were controlled in the El Harouj El Assoued-Oued Boukehela area in October 1989.

6. In Eastern Africa there were a number of reports of swarms in Darfur and Northern Provinces in Sudan between July and September 1989 and also of scattered

adults. However the only reports of summer breeding were of hoppers near El Obeid in Kordofan. Only small numbers of adults were reported from the Red Sea coastal plains during the winter and there were no reports of winter breeding. Further south there were no further reports of breeding in Djibouti but there were several unconfirmed reports of swarms from the eastern part of the Northern Region of Somalia between July and September. These were later stated to be Tree Locusts. There were further unconfirmed reports of swarms in the same area at Durdureh and Elayu in late November and of third to fifth instar green and green and black hoppers and fledglings in early December.

7. During 1990 the situation in the Region has been very calm. Three locusts were seen in Asmara in June and July. In August scattered adults were found by ground surveys in Darfur, Kordofan and Gezira in Sudan but no details are available.

8. In the Near East two swarms were reported in the highlands and eastern lowlands of Yemen AR in late July 1989 and were later stated to have dispersed. In August groups of first to fifth instar hoppers and fledglings were seen in two areas in the eastern lowlands and were controlled. Another swarm was seen copulating and laying in the Yemen Tihama in late August at the same time as scattered adults were seen on the Jizan Tihama of Saudi Arabia. Control commenced against young hoppers in mid-September in Yemen. Subsequently, only scattered adults were reported from the Tihama and the Eastern Lowlands during 1989. Scattered adults were also found in Arfa and Nisab Yemen PDR in mid-August.

9. Isolated fledglings were seen on the Tihama of Saudi Arabia during the winter of 1989-90 and the eastern lowlands of Yemen AR in June 1990. There was further small scale breeding on the Tihama of Saudi Arabia in June and July and preventive control was undertaken by ground and air to prevent gregarisation.

10. In Eastern Arabia, the eastern coast of the United Arab Emirates and Oman was invaded by substantial numbers of adults in late October and early November 1989. There were no further reports of these populations until March when breeding started on the Batina coast of Oman, in the Jaalan, the Sharqiyah and west of Jebel Akhdar following widespread good rain in mid-February. In the first three areas gregarisation occurred and ground and aerial control operations were launched in mid-April. Some 25,000 ha were treated but a number of small swarms were produced in mid to late May. By late June the situation was reported calm.

11. In South-West Asia a seasonal upsurge developed in the summer of 1989. The first reports were of three small swarms in the Lasbela district of Pakistan in early August. Some laying occurred before they were controlled and further control was mounted against hopper bands. However, the invasion proved to be on a larger scale as numerous small mature and laying swarms were reported in the Cholistan, Khipro and Tharparkar deserts of Pakistan and Jaisalmer, Jodhpur and Bikaner districts of India in September. Aerial and ground control was undertaken against the swarms, the ensuing hopper bands and against some small new generation swarms up till the beginning of November, after which only small numbers of scattered locusts were seen in the summer breeding areas.

12. To the west, a moderate upsurge developed in south-eastern Iran during spring 1990. The first reports were of copulating locusts in the coastal area around

Chahbahar and in the interior near Iranshahr in February, and of hatching at the end of the month. In March hoppers of all instars were present near Chahbahar. By the end of April further hatching occurred leading to the formation of hopper groups in both the Chahbahar and Iranshahr areas in May. Over 29,000 ha of hoppers and fledglings were treated up to early June.

13. Control operations were also undertaken against groups of hoppers and adults in the Turbat and Gwadar areas of Baluchistan in Pakistan during May. These were extended to other hopper and adult infestations in the Chagai, Kharan and Kalat districts in northern Baluchistan during June. However in the second half of June a number of immature swarms were reported from the Awaran, Nag, Turbat, Khuzdar, Kharan and Nushki districts, including one of about 150 sq. km. In late July some small swarms reached the Tharparkar desert and laid. In early August hatching occurred and numerous bands were present in patches at four localities in the Tharparkar desert and at one locality in the Khipro desert. Over 400 bands were controlled by mid-August. Ecological conditions were very favourable for breeding in the southern part of the summer breeding area following very heavy rain in early August. Up to late August there were no reports of gregarious breeding from India.

Outlook to December 1990

14. As a result of the very heavy rains in early August in the southern part of the summer breeding area in India and Pakistan it is highly probable that there will be a second generation of hoppers. Providing control operations can be carried out in all infested areas substantial escapes should not occur. If however some infestations cannot be found or treated some swarms could form in late October. These will move west and unless controlled are likely to reach Baluchistan of Pakistan and possibly south-eastern Iran and the eastern coast of the United Arab Emirates and Oman in early November. Small numbers of adults could reach the Gulf of Aden coasts of Yemen and Somalia during December.

15. It is likely that adults will increase in numbers in coastal areas bordering the Red Sea from October onwards and breeding is likely to commence in areas which have received rain or which have been flooded.

16. In West Africa small scale breeding is likely to continue in Air and Tamesna of Niger, Tamesna, the Adrar des Iforas, Tilemsi and Timetrine of Mali and in southern and central areas of Mauritania but it is unlikely that substantial populations requiring major control operations will be produced.

II. OTHER SPECIES

African Migratory Locust

17. A moderate upsurge occurred between the Logone and Chari rivers in south-west Chad and northern Cameroon between August and October 1989. Over 34,000 ha of hopper bands and swarms were sprayed. Limited control was also undertaken in Sudan.

Red Locust

18. There have been no reports in 1990.

Brown Locust

19. As a result of successful breeding at the beginning of the 1989-90 season numerous swarms were produced in South Africa and some reached Lesotho in late December.

Moroccan Locust

20. There were further widespread infestations in the north-western provinces of Afghanistan and some ground control was undertaken.

21. In 1989 and 1990 there was a new upsurge of the Moroccan Locust in Morocco in the Middle Atlas and the south of the High Atlas in areas where upsurges had not been recorded previously. Gregarisation occurred in 1990 and necessitated the treatment of some 13,600 hectares.

Tree Locust

22. Tree Locusts were widespread in the Sahelian zone in 1989 and in the Sudan large scale control operations were mounted during which nearly 500,000 ha were treated mainly in Darfur, Kordofan, White Nile, Blue Nile and Kassala provinces. However, considerable damage to Acacia senegal, the source of Gum Arabic, fruit trees and sorghum was reported.

23. There were numerous reports of swarms of Tree Locust during the dry season of 1989-90 in all the Sahelian countries and some damage to Acacia and fruit trees was reported.

24. There were further infestations in Darfur and Blue Nile provinces in 1990, but they were on a much smaller scale than in 1989.

Grasshoppers

25. After the relatively light infestations of 1988, there were heavy grasshopper infestations in many parts of the Sahel in 1989. Over 11 million hectares were infested and nearly 3.5 million hectares were treated. The heaviest infestations were in a belt stretching from north-central Senegal to western Chad. Oedaleus senegalensis was again the commonest in many northern areas but a number of other species occurred at high densities and caused considerable damage to millet and sorghum, including Kraussaria angulifera, Hieroglyphus daganensis, Diabolo-catantops axillaris, Cataloipus cymbiferus and Kraussella amabile. In Sudan the main species were Aiolopus simulatrix and O. senegalensis. In Cote d'Ivoire there was a significant campaign against Zonocerus variegatus.

26. In 1990 grasshopper infestations in the Sahel were on a much smaller scale than in 1989 and lighter than had been forecast except in the area around Mourdiah in Mali. By mid-September 1990 the total area which had been treated was

approximately 524,000 hectares. In Nigeria upsurges of several species had been recently reported from the northern provinces of Karsina, Kano, Bauchi and Borno where farmers were objecting to the use of pesticides because of fear that their stock animals would be contaminated.

27. In Eastern Africa there was an upsurge of Z. variegatus in Uganda in 1989 over an area of about 10,000 ha which caused locally heavy damage to coffee, banana and cassava. In 1990 there were smaller infestations covering 600 ha.

Control measures undertaken by countries and regional organizations

28. Control measures undertaken against the Desert Locust between June 1989 and September 1990 are shown in Appendix I. They are based on information provided by the countries and regional organizations in their regular reports, supplemented by information provided at the meeting by participants.

29. The grasshopper infestations treated in 1989 and up to mid-September in 1990 are shown in Appendix II.

Assistance provided to countries and regional organizations

30. The bilateral and multilateral assistance provided by donors to the campaigns in 1989 and 1990 is summarised in Appendix III. Revised figures for assistance provided in 1988 are also given.

31. The total assistance in 1989 amounted to US\$ 95,380,411 and the total assistance in 1990 up to the end of August was US\$ 13,158,393. The assistance covered a wide range of equipment and supplies including pesticides, vehicles, radios and protective clothing, the provision of flying hours, operational costs and technical assistance. It was recognised that the figures did not reflect the important role played by Non-Governmental Organizations and did not include research, which would have to be reported differently. The Committee, noting that donor assistance in 1990 had declined markedly from that of recent years, emphasised the need for medium and long term projects to support increased training and research programmes.

32. The Committee expressed its gratitude to the donor community for the very generous assistance which had been provided to the affected countries. In the view of the current situation in South-West Asia, the DLCC recommended that the FAO should now seek adequate assistance for this region. In this context the Chairman of the FAO South-West Regional Locust Commission could consider inviting potential donors to meetings of the Commission. The Committee emphasised the value of the National Coordinating Committees which have been formed in many of the affected countries.

The International Desert Locust Task Force

33. The Committee was provided with a Summary of the activities undertaken within the framework of the International Desert Locust Task Force, which was created in early 1989 (see Appendix IV).

Report of the Technical Advisory Committee (Rome, June 1990)

34. As recommended at the 30th Session of the DLCC, FAO convened a meeting of a Technical Advisory Committee in June 1990, the report of which is given at Appendix V. The Committee took note that the Technical Advisory Committee no longer existed.

35. The Committee considered that a subsidiary body of the DLCC should be created, wherein technical issues can be analysed and discussed, and advice provided to the DLCC. It was agreed that this subsidiary body be called the Desert Locust Technical Group.

36. The terms of reference of the Desert Locust Technical Group would be to:

- study and report to the FAO Desert Locust Control Committee on all technical and scientific matters pertaining to the control of the Desert Locust;
- report and advise on specific issues referred to the Technical Group by the DLCC;
- oversee and follow up recommendations of the DLCC;
- advise the Secretariat on the agenda for future meetings of the DLCC.

37. The composition of the Desert Locust Technical Group would be a small number of locust experts of the highest technical standing nominated for a period of two years. The Committee recommended that the following be members of the Technical Group for the first two years:

Mr T Ben Halima
Mr S B Hadramy
Mr A M Karrar
Mr M Shafi
Mr L Soumare

38. The Desert Locust Technical Group would have the authority to co-opt additional members according to the specific matters to be discussed. FAO would provide the Secretariat. Its activities would be funded from the International Trust Fund 9161.

39. The Technical Group will meet twice a year.

Report of the UNDP/FAO Scientific Advisory Committee (SAC) on Desert Locust research

40. The Chairman of the UNDP/FAO Scientific Advisory Committee (SAC) on Desert Locust research reported on the role of the SAC and on its work to date. It was basically created to advise UNDP on the suitability for funding of research projects aimed at developing alternative strategies for Desert Locust control. Membership for the first three years were of experts selected in their personal capacity from Australia, Canada, France, FR Germany, Sudan, U.K., USA and the Special Programme of African Agricultural Research (SPAAR), with permanent representatives from UNDP and FAO.

41. The SAC had met in November 1989, March 1990 and in the week immediately before the 31st Session of the DLCC. It had forwarded recommendations to donors and potential donors on research proposals which had been submitted to it, principally in the fields of basic physiology, remote sensing and forecasting, modelling and biomodelling and biocontrol strategies. The SAC was in the process of preparing a paper summarising its views on what further research should be done.

42. The DLCC emphasised the need for greater involvement of scientists and institutions in the Desert Locust affected countries. The Chairman of SAC announced that SAC had anticipated this request and it was agreed that extra members from the affected countries would be nominated.

Desert Locust Preventive Control in West and North-West Africa

43. The Committee was informed about developments since the 30th Session of the DLCC in particular about the discussions which had taken place with the participating countries and potential donors regarding the Desert Locust preventive control project in West and North-West Africa (see Appendix VI). The Committee noted that consultations were still under way between FAO and IFAD over the modalities for executing the project. In this context a project document and plan of operation will be prepared by FAO by early November 1990 using the IFAD appraisal report as a basis. All the documents would be submitted to participating countries and donors.

44. The Committee regretted the delay which had occurred in the preparation of the project proposal and welcomed the statement that a draft project document would soon be available.

Desert Locust Research

45. The Committee had very full discussions on a wide range of Desert Locust research issues. The length of the discussions reflected the increased awareness of participants in the development of effective and environmentally acceptable control methods and emphasised the need for cooperation between field workers and laboratory workers and the need to strengthen research stations in the affected countries. The Working Paper prepared by the Secretariat is shown at Appendix VII.

(a) Insect Growth Regulators (IGRs)

46. These are one of the most promising classes of pesticides for control of nymphs. Some field tests had been undertaken in Senegal, Chad and Mali but the results were variable. Further field trials should be encouraged.

(b) Biological Control

47. After many years of testing it appeared that of Nosema locustae was unlikely to make it a candidate for locust control when used alone. However, it might be a component of an IPM package.

48. Interest now focussed on fungal pathogens (mycopesticides). A joint CABI/IITA/DFPV project funded by the Netherlands, USAID, ODA and CIDA had been launched, aimed at exploring for potential pathogens and evaluating species of Beauveria and Metarrhizium in the field. It was anticipated that mass production could be achieved by a cottage industry. The project was also looking at ways of protecting new products against excessive commercial restrictions.

(c) Alternatives to dieldrin

49. IGRs are likely to be the best alternatives as biological agents were likely to act as contact pesticides.

(d) ULV application methods and pesticide drift.

50. Although there were some new sprayers they were essentially modifications of older equipment. A UNDP/FAO project RAF/88/033 had tested and evaluated a range of ground sprayers and, in conjunction with a manufacturer, Micronair, had developed a new ULV head (AU8000), which can be attached to hand held sprayers, knapsack sprayers or vehicle mounted sprayers. Morocco had also tested a large number of sprayers but had found that most were not well adapted to African conditions.

(e) Pesticide Stocks

51. The heavy grasshopper infestations in West Africa and the recent Desert Locust plague and its rapid decline had focussed attention on the problem of pesticide stocks. Very large quantities of pesticide were present in many countries, often under very poor storage conditions. Many stocks were time-expired and often in leaking drums. There was an urgent need to prepare inventories of stocks, to contain them safely and finally to dispose of unwanted stocks. There was no ready-made, simple or inexpensive method of pesticide disposal; one solution was to use locust pesticides against other pests.

52. The Committee recommended that FAO should prepare a plan in conjunction with donors and the affected countries to make inventories of stocks, to repackage pesticide which is in leaking or damaged drums, to construct safe stores and finally to introduce methods for the disposal of unwanted/obsolete stocks.

(f) Meteorology and the Desert Locust

53. The representative from WMO provided information on the supply of meteorological information and its use in locust control activities. National meteorological services are conscious of the benefits of the interdisciplinary approach to the use of the meteorological information. The representative gave information about the plans to reinforce the observation network, the development of codes to transmit locust information rapidly on the global meteorological telecommunication system (GTS), the training of meteorological observers, the writing up of case studies of the successful use of meteorological information in locust control and on the provision of data for research and model development.

The meeting recognised the importance of meteorological information for locust control and supported the continuing reinforcement of the observation networks.

(g) Environmental Concern

54. The Committee fully recognised the need to take environmental issues into account when formulating action proposals. It recommended that Environmental Concern be a standing item on the Agenda of the DLCC.

(h) Remote Sensing

55. The Committee was informed about recent and proposed future developments in the use of remote sensing products for Desert Locust survey and control and noted the value of the "greenness" vegetation maps which had been provided to the Sahelian countries and ECLO by USAID, through the Agrhymet Centre, and by the FAO Remote Sensing Centre. It was noted however, that the availability of remote sensing data which could be used operationally was very uneven and that there was a need for further training in the interpretation of the data.

Training

56. The Committee reviewed current training programmes and strongly endorsed the view of the Technical Advisory Committee that training should be accorded the highest priority now that the emergency was over.

57. The Committee recommended that FAO should commission a study on the status of training among the member countries of the DLCC. The study should cover the training needs in different countries and regions, existing training infrastructure and make recommendations for the next three years. It should also look into the funding arrangements for the activities recommended. The funding for this study should come from the International Trust Fund 9161. The results of this study should be reviewed by the Desert Locust Technical Group before the next meeting of the DLCC.

International Trust Fund 9161: Contributions and expenditure

58. The Secretariat presented a statement on the budget and the accounts for 1989-90 (Appendix VIII). The total expenditure in 1989 amounted to US\$ 26,779. To 31 July 1990 expenditure had been US\$ 41,304 leaving an unallocated balance of US\$ 263,387. Outstanding contributions amounted to US\$ 959,931 as of 30 June 1990.

59. The Committee accepted the budget and accounts and presented by the FAO Secretariat. It expressed concern over the level of outstanding contributions.

60. The FAO Secretariat requested advice from the Committee on the use of current funds and it was recommended by the Committee that greater emphasis should be placed on the use of funds for training and for the operation of the Desert Locust Technical Group. The Committee recommended the use of ITF 9161 funds for long term training to supplement those funds which exist within the FAO Regional

Commissions. The Secretariat was requested to prepare an outline training programme, both for short and long term training.

Status of Regional Commissions and Organizations

61. Information was presented to the Committee on the state of the FAO regional commissions and of the regional locust control organizations, with the exception of DLCO-EA, since no delegate was present. Details are given in Appendix IX. The Committee recommended that at future sessions of the DLCC a working paper on the activities and the budget of the regional commissions and organisations should be presented to the DLCC.

62. The Committee strongly recommended that FAO investigate the strengthening of the regional commissions by the provision of additional staff and other resources. In particular the Committee requested FAO to consider the immediate re-establishment of the post of Regional Locust Officer in the FAO South-West Asia Desert Locust Commission, and the immediate restoration of the headquarters of this Commission within the Region. The Committee recommended that joint Indo-Pakistan border surveys should be resumed.

63. The Committee was informed of the proposed transfer of the seat of the Near East Commission from Jeddah to Cairo and its integration into the FAO Regional Office for the Near East.

64. The Committee was informed that the Government of Egypt welcomed the proposed transfer of the seat of the Near East Commission to Cairo.

Any other business

65. The Committee was informed that, although a final decision had not yet been taken by FAO, it was likely that the Emergency Centre for Locust Operations would not function beyond December 1990.

66. The Secretariat assured the Committee that, irrespective of the decision on the future operations of ECLO, FAO would continue its traditional role and activities in migrant pest control through the Locusts, other Migratory Pests and Emergency Operations Group.

Date and place of next Session

67. The Committee agreed that the next session of DLCC would be held at FAO Headquarters, Rome, at a time to be chosen by the Director-General of FAO.

CONTROL MEASURES UNDERTAKEN AGAINST DESERT LOCUSTS, JUNE 1989 - AUGUST 1990

COUNTRY	PERIOD	INFESTATION	AREA PESTICIDE			METHOD	NOTES
			(ha)	QUANTITY	TYPE		
DJIBOUTI	Jun-89	bands	5,000	n/a	n/a	ground	
INDIA	Aug-Nov 89	swarms, adults, bands	49,572 {	14,450	ULV (l)	ground/air	
				1,580	EC (l)	ground	
				62	dust (t)	ground	
IRAN	Feb-May 90	swarms, adults, bands	29,516	17,395	ULV	ground	
MALI	Sep-Dec 89	adults & hoppers	9,278	4,640	ULV (l)	ground/air	
LIBYA	Oct-89	groups of fledglings	3,833			ground	
NIGER	Dec-89	adults & hoppers	9	22	ULV (l)	ground	
OMAN	Mar-Jun 89	swarms & bands	56,750	56,750	ULV (l)	ground/air	
PAKISTAN	Jun-Nov 89	swarms, adults, bands	531,500 {	19,527	ULV (l)	ground/air	
				2,628	dust (t)	ground	
				21,232	ULV (l)	ground	
	May-Aug 90	swarms, adults, bands	98,900 {	8	dust (t)	ground	Jul-Aug 90 n/a
SAUDI ARABIA	Jun-90	adults & hoppers	8,000	n/a	n/a	ground/air	
UAE	Nov-89	adults	3	3	ULV (l)	ground	Jun-Jul 89 n/a
YEMEN AR	Aug-89	hopper groups	1,200	n/a	dust	ground	
				1,000	ULV	ground	
				n/a	ULV	ground	
	Sep-89	bands	n/a	n/a	ULV	ground	
TOTAL AREA TREATED			=====	794,561			

Note: (l) = litres (t) = tonnes n/a = not available

CONTROL MEASURES UNDERTAKEN AGAINST GRASSHOPPERS, JANUARY 1989 - AUGUST 1990

COUNTRY	1989		1990		NOTES
	AREA (ha)	METHOD	AREA (ha)	METHOD	
BENIN	35,000	ground	n/a		up to 31.7.90
BURKINA FASO	399,755	ground/air	56,000	ground	up to 15.8.90
CAMEROON	105,000	ground/air	(no reports)		
CHAD	254,175	ground/air	16,564	ground	up to 15.9.90
COTE D'IVOIRE	200,000	n/a	(no reports)		
GUINEA BISSAU	6,500	ground	(no reports)		
MALI	722,492	ground/air	308,043	ground/air	up to 20.9.90
MAURITANIA	487,218	ground/air	62,693	ground/air	up to 20.9.90
NIGER	709,556	ground/air	446,238	ground/air	up to 10.9.90
NIGERIA	n/a	n/a	(no reports)		
SENEGAL	529,413	ground/air	93,022	ground	up to 31.8.90
UGANDA	10,000	ground			
TOTAL	3,449,109		982,560		

ASSISTANCE PROVIDED TO COUNTRIES AND REGIONAL ORGANIZATIONS

January 1989 - August 1990

Although the Desert Locust plague collapsed in the last quarter of 1988 and the first quarter of 1989 the international donor community continued to provide very generous assistance to affected and potentially affected countries both to ensure that there was no resurgence of the plague and to assist the campaigns against the very large grasshopper infestations which developed in late 1989. Considerable assistance was also provided or pledged in early 1990 to help combat the anticipated grasshopper infestations in late 1990. It comprised:

African Development Bank

In 1989: US\$ 5,400,000 to 10 countries in West, North-West, North and East Africa, DLCO-EA and OCLALAV and US\$ 619,730 for research.

In 1990: US\$ 2,300,000 over 3 years to IRLCO-CSA to build and equip a laboratory, vehicles, training and consultants.

Algeria:

In 1989: US\$ 306,800 for fuel and pesticides to Mali and Mauritania.

Belgium:

In 1989: US\$ 1,286,480 through FAO for emergency operations and research.

Canada:

In 1989: US\$ 3,126,160 to West Africa, North-West Africa and Sudan for operational costs, technical assistance to form and train village brigades and pesticide.

In 1990: US\$ 360,000 for flying hours in West Africa, and technical assistance for training and operating expenses for Niger.

China P.R.:

In 1989: US\$ 120,000 for pesticide for Mauritania.

In 1990: US\$ 120,000 for pesticide for Burkina Faso.

Denmark:

In 1989: US\$ 2,400,000 assistance to Sudan mainly for pesticide, operating expenses, environmental monitoring and mobile workshops.

In 1990: US\$ 390,000 to Burkina Faso (Liptako-Gourma authority) and Mali for pesticide and vehicles.

EEC:

In 1989: US\$ 11,600,948 to Burkina Faso, Chad, Mali, Mauritania, Niger, Senegal, Morocco and Sudan, mainly for pesticide, application equipment, protective clothing, radios, spare parts, technical assistance, flying hours, transport costs, rehabilitation of bases and operating expenses.

In 1990: US\$ 1,717,600 to Burkina Faso, Chad and Sudan for ULV sprayers, fuel, rehabilitation of bases and operating expenses.

EAQ (through the Technical Cooperation Programme):

In 1989: US\$ 2,642,000 to Cameroon, Mali, Mauritania, Togo, Kenya, Uganda, Zimbabwe, Lebanon, Syria, Yemen AR, Yemen PDR, Honduras, El Salvador, and Latin America (Regional) mainly in the form of technical assistance, training, application equipment, flying hours and operating expenses.

In 1990: US\$ 317,000 to Somalia, IRLCO-CSA and Nicaragua for technical assistance, training, equipment and supplies and operating expenses.

Finland:

In 1989: US\$ 75,000 to Ethiopia for aircraft operations.

France:

In 1989: US\$ 3,410,108 for the Ecoforce units provided to Burkina Faso, Cameroon, Chad, Mali, Mauritania, Niger and Senegal; the equivalent of 4,000,000 FF for Eastern Africa and ECLO and 6,900,000 FF for PRIFAS.

In 1990: US\$ 3,780,000 for Ecoforce units in West Africa.

Germany, F.R:

In 1989: US\$ 14,595,158 to Burkina Faso, Cape Verde, Chad, Guinea, Mali, Mauritania, Niger, Senegal, Algeria, Morocco, Somalia, Sudan and Jordan mainly in the form of pesticides, vehicles, application equipment, protective clothing, camping equipment, radios, flying hours and operating expenses.

In 1990: Up to US\$ 353,000 for campaign expenses.

India:

In 1989: US\$ 8,800 for pesticide to Mauritania.

Islamic Development Bank:

In 1989: US\$ 478,000 for vehicles and sprayers for Mauritania.

Italy:

In 1989: US\$ 290,000 to Chad, Gambia, Mauritania and Senegal for pesticide, vehicles, flying hours and technical assistance.

Japan:

In 1989: US\$ 8,000,000 for pesticide and vehicles to Algeria, Chad, Ethiopia, Mali, Mauritania, Morocco, Niger, Senegal, Somalia, Sudan and Tunisia (through FAO); US\$ 2,800,000 for pesticides and sprayers to Guinea, US\$ 2,539,000 for additional vehicles and sprayers for Mauritania and US\$ 2,450,000 for additional vehicles and sprayers for Niger.

In 1990: US\$ 1,276,000 for pesticides for Niger and US\$ 700,000 through FAO for pesticides, equipment and training.

Korea:

In 1989: US\$ 38,000 to Mauritania for sprayers.

Luxemburg:

In 1989: US\$ 165,000 to Mauritania for hire of an aircraft, vehicles and field survey equipment.

In 1990: US\$ 335,000 to Niger for aircraft hours and ground support.

Morocco:

In 1989: US\$ 270,000 to Mauritania in the form of vehicles, sprayers, radios, camp equipment, pesticide and locust officers.

Netherlands:

In 1989: US\$ 1,867,371 to Sudan, Senegal and to Regional African projects, mainly in the form of aircraft hours, pesticides, protective clothing, radios and operating expenses.

In 1990: US\$ 313,560 to Senegal through FAO for ecotoxicological studies.

NGOs:

In 1989 the World Lutheran Federation provided sprayers in Mauritania and Care International provided operating expenses in Chad.

Norway:

In 1989: US\$ 2,000,000 for grasshopper control in Western Mali mainly in the form of helicopter hours and pesticides.

Organization of African Unity:

In 1989: US\$ 315,000 to Burkina Faso and Senegal for operating expenses.

Saudi Arabia:

In 1989: US\$ 266,667 to Mauritania in the form of vehicles, sprayers and pesticides.

Spain:

In 1989: US\$ 63,000 to Mauritania for pesticides.

Sweden:

In 1990: US\$ 70,000 to Burkina Faso for pesticide.

Switzerland:

In 1989: US\$ 351,520 to Chad, Mali and Sudan for pesticides, environmental monitoring, spares, general operating expenses.

In 1990: US\$ 26,233 to Chad for general operating expenses.

Tunisia:

In 1989: US\$ 112,000 for pesticide for Mauritania.

United Kingdom:

In 1989: US\$ 851,500 to Gambia, Mali, Ethiopia, Sudan and IRLCO-CSA for vehicles, sprayers and pesticides.

UNDP:

In 1989: US\$ 49,113 to Mauritania for fuel.

In 1990: US\$ 30,000 to Cameroon for pesticide.

UNICEF:

In 1989: US\$ 2,000 to Burkina Faso for training.

USAID:

In 1989: US\$ 22,998,052 to Cape Verde, Gambia, Mali, Mauritania, Niger, Senegal, the West African Region, Algeria, Morocco, Tunisia, Ethiopia, Sudan, the African Region, Jordan and Pakistan mainly in the form of flying hours, pesticides, technical and logistics support, fuel, spare parts, radios, greenness maps and operating expenses.

In 1990: US\$ 1,070,000 to Burkina Faso, Mali, Niger and Sudan for flying hours, fuel, greenness maps, pesticide management, base reconstruction, training and pesticide trials.

USSR:

In 1989: US\$ 120,000 to Mauritania for pesticide.

World Food Programme:

In 1989: US\$ 6,750 for Burkina Faso for rations.

INTERNATIONAL DESERT LOCUST TASK FORCE

In accordance with recommendations and resolutions adopted by various meetings, conferences and assemblies (Fez, October 1988, UNGA, November 1988, Dakar, 1989, Rome, DLCC 1988), FAO/ECLO, working in close cooperation with donors and with locust-infested countries, set up an international Desert Locust Task Force under the technical and organizational responsibility of FAO/ECLO. The Task Force was to cover areas seriously infested and/or of difficult access. The objective of these mobile units was to provide direct support to the affected countries and to coordinate locust control actions with the national plant protection services, with regional organizations, and with donors participating directly in control operations under bilateral assistance.

The most direct Task Force target areas were West Africa, East Africa, and, initially, the Arabian Peninsula. An expert committee meeting in Rome in January 1989 thought that ITF units would have to be set up in areas where the risk of desert locust breeding and multiplication was highest and where access was difficult due to terrain, shared borders or distance from the main supply centres and cultivated areas.

These units were to be deployed, therefore, in southern central and northern central Mauritania, north-eastern Mali, north-western Niger, eastern Chad and western Sudan and, lastly, both sides of the Red Sea, with the exception of Saudi Arabia. Their positioning was not fixed as to area and period, but was rather intended to adapt to the locust situation as it developed in the predefined strategic areas. These units, deployed in strategic zones far from cultivated areas, were backed by France with its Ecoforce, and the North African countries with the Maghreb Task Force, which have been operational since 1989 with optional deployment in cultivated areas in case of need.

Concerning the locust situation, while there has been a decline in locust infestations since late 1989 but the reasons for this are poorly understood. The history of desert locust invasions argue in favour of continued vigilance and surveys in breeding and outbreak areas so as to maintain the current recession. The Ecoforce and the Maghreb Task Force were renewed in 1990 for this reason.

COMPONENTS OF THE INTERNATIONAL DESERT LOCUST TASK FORCE

1. Maghreb Task Force

The Maghreb countries, aware of the need to keep Desert Locust populations as small as possible in the Sahara regions of northern Mali, Niger and Mauritania, believed joint surveys with these three Sahel countries, followed by control efforts as needed, should be continued until full recession was achieved throughout the region. They therefore set up the Maghreb Task Force whose major objectives are:

- to help reinforce Desert Locust control in the worst infested areas and those with the least treatment capability;
- to reinforce cooperative links between Maghreb and Sahel countries;
- to use the Task Force as a vehicle for the exchange of locust expertise, information and training opportunities between the two regions.

The Maghreb Task Force units were deployed in 1989 and again in 1990 in south-eastern Mauritania; in north-eastern Mali in 1989; and in the north-western part of Niger in 1989, and again in 1990.

2. Ecoforce

In August 1989 the Ecoforce locust control units were positioned in the western Sahel. Thereafter, despite the absence of Desert Locusts, all Ecoforces were mobilized for survey and control operations against exceptionally large outbreaks of various species of grasshoppers which caused severe damage to crops, particularly millet and sorghum, throughout the Sahel in 1989.

Grasshopper infestations in Senegal, particularly in the Thies and Senegal River Valley areas, were followed by massive outbreaks in Mauritania (predominantly of Oedaleus senegalensis), particularly in the Kaedi and Selibabi areas.

By early September Chad was also severely infested, particularly by African Migratory Locusts south of N'Djamena (Bongor-Guelendeng).

Lastly, the lake area of Central Mali in the central Niger River delta, and the Zinder area in Niger were, in turn, subjected to infestations of various grasshopper species.

The gradual establishment of ground-based logistical support from the Ecoforces, which became operational in early September, facilitated a relatively quick mobilization of aircraft as and when requested by the Governments of the countries involved.

3. Other components of the Task Force

Fixed or mobile units were also operational in specific strategic areas in 1989 either under the FAO/ECLO Task Force plan (e.g. DLCO-EA) or in the bilateral context (Canada, USAID, GTZ).

**REPORT OF A FAO TECHNICAL ADVISORY COMMITTEE MEETING
FOR 31ST SESSION OF THE DLCC**

Rome, 11-12 June 1990

INTRODUCTION

1. The 30th Session of the DLCC urged that consideration be given to reactivating the Technical Advisory Committee on Desert Locust Control, which last met in 1966, or to creating a panel of independent experts to prepare technical briefings for the DLCC.

1. Accordingly, the Director-General invited representatives of the two Regional Desert Locust Organizations, the three Regional FAO Desert Locust Commissions, the most concerned donors (France, UK and USA), UNDP and the secretaries of the FAO Regional Desert Locust Commissions, to meet as a technical advisory committee in Rome on 11-12 June 1990 to prepare an agenda and working papers for the 31st Session of the DLCC.

3. The meeting was opened by Dr Brader, Director of the FAO Plant Production and Protection Division, who welcomed committee members and noted that the present period, which was relatively free from Desert Locust infestations, offered a good opportunity to strengthen the effectiveness of the DLCC. The Committee was requested to consider mechanisms to achieve this aim and to review existing Terms of Reference and methods of operation for the TAC. An agenda should be prepared for the DLCC and consideration should be given to technical issues for which reports and draft recommendation for adoption would assist the DLCC. Finally, the Committee was reminded that the Terms of Reference for the DLCC were last reviewed in 1968 and might need amending. Dr Brader regretted that he would be unable to attend the entire meeting and handed the chair to Mr McCulloch.

Officers of the Meeting

Chairman: Mr L. McCulloch, FAO.

Drafting Committee

4. The drafting committee were Mr Ben Salah, Chairman of the FAO Commission for Controlling the Desert Locust in North-West Africa, Miss J. Magor, ODA, UK and Mr J. Roffey, FAO. In addition, Mr Soumaré, Technical Director of OCLALAV, Mr W. Thomas (USAID), and Mr Mahjoub, the FAO Regional Locust Officer in North-West Africa, formed a working group to review current guidelines on information needs for national and regional organizations and FAO.

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LOCUST SITUATION

Desert Locust

The Committee reviewed the Desert Locust situation, paying particular attention to recent developments in eastern Arabia and in the Eastern Region. Control operations had been effective on the Batina coast of Oman and only a few immature adults were present at the end of May. In the Sharqiyah, however, in late May 1990 there were many extensive areas of recently fledged adults reaching densities of 5 to 8 per square metre over areas of up to 12-15 square kilometres and there were still large areas of green vegetation. Two spray helicopters were operating in the area and two spray aircraft from Pakistan arrived on 5 June. A swarm reported at Sur on 8 May may have represented escapes from earlier breeding. Some adults

were reported from the Al Ain area of the United Arab Emirates. Up to 5 June 29,700 hectares in the Batina and Sharqiyah had been treated using 15,900 litres of ULV pesticides. The situation was viewed as potentially serious and substantial escapes were likely to reach Pakistan in the next few weeks.

Breeding was reported to have started in south-eastern Iran in February but no recent information was available.

In Baluchistan in Pakistan patchy breeding was in progress in coastal areas in early May, mainly in sorghum and millet cultivations. Most of these had been cleared by late May but subsequently considerable numbers of adults were seen moving east. A total of 5,685 litres of ULV pesticide and 1,434 kg of bait dust had been applied over 13,500 hectares by the end of May.

In the summer breeding area good rains had fallen in Bikaner and Jaisalmer districts during the third week of May.

Elsewhere, the situation was calm in Saudi Arabia, the DLCO-EA region, North-West Africa and the OCLALAV region.

African Migratory Locust

The upsurge which occurred in the Chari and Lagone river basins and the Lake Chad basin in late 1989 had subsided but with summer rains likely to start in the Lake Chad outbreak area in June, further gregarization may occur.

Red Locust

There have been no recent reports.

Brown Locust

There had been widespread breeding in South Africa early in the 1989-90 season and some swarms had reached Lesotho in December 1989.

Moroccan Locust

There was no information on the severity of the current infestations in North-West Afghanistan.

Tree Locust

Many swarms had been reported during the dry season of 1989-90 but little damage to cultivated trees had occurred.

Grasshoppers

There have been no reports of hatching but these were likely to be imminent as rains had fallen up to 13°N.

TECHNICAL ISSUES DISCUSSED

Information

The meeting stressed the importance of information being collected and exchanged regularly. Locust surveys were the responsibility of national units and the need for a well

defined channel for onward transmission to regional centres and FAO Commissions and to FAO headquarters was recognised.

Participants expressed concern that mechanisms for improving the flow of information should consider the needs for current campaigns as well as long-term solutions. The committee recognised the need to identify all constraints to the flow of information.

The committee recognised the importance of reviewing existing guidelines on the collection, standardization and exchange of information and a working group was nominated to report on these issues. The recommendations of the working group are given below..

The committee concluded:

- that insufficient information on the Desert Locust situation the the affected countries reached FAO and the regional organizations and commissions;
- that the information which is transmitted is not sufficiently detailed, it arrives late and is often incomplete, which seriously hinders the preparation of situation summaries and early warnings. The need for more detailed and timely information was becoming more critical as donors were increasingly asking for such information when considering assistance;
- the system of distributing information at the nation, regional and international levels set up by the DLCC was not operating as intended.
- the Committee underlined the important role of the countries and the regional organizations in the collection and transmission of information to FAO.

Consequently, the committee recommended:

- the re-evaluation of the system of the collection and transmission of information set up by the DLCC in order to identify constraints at various levels and to make proposals to improve it and to make it more operational;
- that for the 1990 campaign arrangements should be taken at national and regional levels for the collection and timely transmission of detailed information in order to be better able to follow the evaluation of the Desert Locust situation.

The committee requested the Secretariat to provide progress reports on the use of remote sensing to locate vegetation and to estimate rainfall in locust habitats.

Survey

The committee, taking into consideration the onset of a new recession recommends:

- that vigilance is essential and that surveys should not only be maintained but that their methodology, timing and areas to be covered need to be re-examined in depth;
- that major efforts be made in the Near East and South-West Asia to eliminate the remaining high density populations;
- to update the preventive control strategy for all affected countries and to help the countries identify the resources necessary to implement the strategy;

- to mobilise financial resources, in conjunction with the affected countries and donors, to ensure the success of the preventive control strategy. Implementation of this strategy should be considered as a development programme of high priority, aimed at avoiding the need for emergency operations.
- the setting up of a system of periodic evaluation by autonomous consultants, who could sound the alarm each time a deficiency is detected and assure donors of the correctness of the approach.

Control

The committee recommends that the DLCC should study the following issues:

- the analysis of the 1987-89 plague, drawing attention to the more successful and the less successful aspects. It should include analysis of the pesticide used, the costs of the operations and the responsibilities at national, regional and international levels;
- the needs of countries still infested;
- the launching of projects to:
 - a) develop control methods which are environmentally safe, with the participation of industry;
 - b) ensure that pesticides in good condition are suitably stocked;
 - c) monitor pesticide stocks to detect the presence of isomers toxic to humans and the environment;
 - d) recycle, reformulate or destroy highly toxic pesticide formulations without environmental contamination.

RESEARCH

The committee was informed about the increased interest in research on the Desert Locust which had been generated by the recent plague, of the priorities in research which had been expressed at various meetings and about the work of the Scientific Advisory Committee which had been nominated by UNDP and FAO to review research proposals submitted to UNDP for funding.

Concern was expressed that the affected regions had not been represented when research priorities were being drawn up or when the Scientific Advisory Committee was established. On the first point, the TAC would inform the DLCC of any research gaps brought to its notice. On the second, it was made clear that the SAC was an independent body not directly linked to any locust organization and that the Chairman of the SAC would report in person to the DLCC.

The committee agreed that the Secretariat should prepare a progress report to the DLCC on research currently in progress.

The committee also requested the Secretariat to include a list of resources available at the Desert Locust Field Research Stations in the next edition of the FAO Desert Locust Research and Development Register.

The committee agreed that six specific research topics should be considered by the 31st Session of the FAO Desert Locust Control Committee, i.e. insect growth regulators, biological control, alternatives to the persistent pesticide dieldrin, advances in ULV application techniques, pesticide drift and pesticide stocks in the Sahel.

The committee also considered that a major problem lies in implementing the results of research and recommended that this issue be discussed by the DLCC.

The committee recommended that consideration be given to the holding of an international Desert Locust research conference.

The committee was informed that the SAC was considering ways of re-establishing a locust abstract and news service.

TRAINING

The committee strongly recommended the need for training at all levels as it was of the highest priority. It especially emphasized the needs for hands-on training. The committee recommended that the DLCC should ask donors for further support for training activities as a matter of urgency.

The committee recommended that the possibility of a new training project be considered by the DLCC

Review of ECLO Operations 1986-1990

The committee was informed that FAO had commissioned a review of ECLO operations between 1986 and 1990 and that the final report should be ready for presentation to the DLCC in September.

Any other business

In view of the recommendation of the 30th Session of the DLCC requesting the Director-General to undertake the necessary measures to revitalise the DLCC, the committee considered that its own mandate and composition should be examined in this light. The committee requested FAO to study the matter and prepare proposals for discussion at the next session of the DLCC.

The committee studied the state of advancement of the preventive control project for West and North-West Africa and regretted the delay in the finalisation of the project which had been due to start in January 1990. It recommended that the Secretariat study the possibilities of finalising the project proposal and to report on this to the DLCC.

**MEDIUM-TERM PROJECT FOR PREVENTIVE CONTROL
IN WEST AND NORTH-WEST AFRICA**

INTRODUCTION

The most recent Desert Locust plague, which followed a lengthy recession period broken by various periods of locust warnings and which affected more than one continent, dramatically highlighted the imperative and urgent need to reinforce and re-establish reliable, permanent preventive control arrangements.

Such arrangements are indeed necessary for all regions harbouring outbreak areas, a belt stretching from the Indo-Pakistan border to the west coast of Africa. In any case, the currently proposed preventive control programme concerns only the western section of the remission areas and covers specific Sahel and Maghreb countries. An analogous programme intended for other parts of the remission area, particularly the central part, should be set up once feasibility studies have been completed.

Desert Locust preventive control has, in fact, several highly specific features: the work of the survey teams responsible for surveillance must go forward without a hitch to avoid unleashing the process of gregarization. Outbreak areas are known to be mostly located in desert or semi-desert areas where living conditions and particularly travel are often quite difficult.

The national Desert Locust preventive control units to be established in the western invasion area countries will have to function as parts of a coherent whole, for locusts know no boundaries. There is a great deal of interdependency and any local hitch is potentially harmful to neighbouring countries. Information about locusts and meteorological conditions must circulate rapidly and field actions must be perfectly coordinated. This means standardizing data processing, collection methods and ongoing research. Training sessions must be harmonized.

The FAO role, its Desert Locust Control Committee (DLCC) and its Regional Commissions and Regional Agencies (OCLALAV, DLCO-EA) are all expressions of the interdependent nature of locust control. There is no need to reiterate the validity of this inter-regional project, its origin was the outcome of a number of concertations, meetings, and high-level appeals to have the programme finalized and implemented at the earliest possible date by FAO and IFAD.

At its Thirtieth Session, the DLCC, in endorsing the rationale of the project, recognized the 'urgency of its implementation in the shortest time possible'. It insisted that FAO should have responsibility for the technical aspects and operation of the project.

The project being in the final phase of evaluation by IFAD, it would be appropriate for FAO and IFAD to specify the nature of their collaboration for funding and implementation. Concerning the administration of the project, it would be advisable to specify whether the division of the respective responsibilities of FAO and IFAD is to be made official. Finally, it should be ascertained whether the contributions of donors willing to contribute will cover the bulk (and possibly all) of the project's requirements and thus guarantee the cohesiveness of preventive control operations in the project countries.

DESERT LOCUST RESEARCH

As stated at the 30th Session of the Desert Locust Control Committee, June 1989, relatively little new longer term research had commenced, and FAO had initiated research activities mainly of an operational nature. The longer term research activities particularly those aimed at developing alternative control strategies are being considered by the joint UNDP/FAO Scientific Advisory Committee. This paper describes research activities undertaken by FAO, mainly through donor funded projects, which have been carried out in 1989 and 1990.

1. Desert Locust Research and Development Register

A second edition of the register was published in March 1990. A third edition is planned to be published in March 1991, which will incorporate new information on research activities and organisations. West Germany, France and UK have also published registers detailing locust related research being undertaken by institutes/organisations in their respective countries.

2. Environmental Impact Studies

The pilot study to examine the environmental effects of locust/grasshopper control, based in Senegal, was operationally completed in late 1989 and the final report is expected to be published shortly.

Essentially this study indicated that the most severe direct non target effects were experienced by aquatic organisms.

Some groups of beneficial, non target, arthropods were substantially reduced by spraying, and populations did not recover significantly during the study period.

Apart from the above other non target insect populations did show recovery within a short period (3-4 weeks).

Only very minor bird mortality was observed and this was confined to plots which were heavily over dosed (x2). In all plots sprayed with organophosphate pesticides (fenitrothion, chlorpyrifos) there was significant emigration by birds due to depletion of the food supply caused by spraying.

2. Migration case studies

A study of the trans Atlantic migrations of Desert Locust in late 1988 was undertaken jointly between FAO and NRI, UK. The study indicated, through wind trajectories and locust reports, that northern Mauritania and western parts of the Sahara, were the likely source areas for the populations which traversed the Atlantic. The results of this study are expected to be published shortly.

Further cooperative studies including FAO, NRI and the Algerian Meteorological Service (ONM) to study large scale locust migrations which occurred during the 1986-88 plague are planned for late 1990.

3. Modelling

A computer model to predict both egg incubation and nymphal development periods of the Desert Locust has recently been completed and validated. The model uses daily air temperature as the main input to calculate development. The results of this study are to be published shortly and copies of the program will be made available to all interested parties.

It is anticipated that the development of a computer trajectory model to simulate Desert Locust migration will be initiated in late 1990.

4. Pesticide trials

FAO has continued to collaborate with various organisations in evaluating pesticides for locust/grasshopper control.

In both 1989 and 1990 FAO jointly with Southampton University with donor assistance from the Netherlands has carried out trials of the insect growth regulator diflubenzuron with the assistance of the Plant Protection Service of Mali.

Additional trials of selected pesticides and also of Nosema were also carried out in 1989 and 1990 in collaboration with other organisations.

5. Application studies

Pesticide application studies to examine the efficacy of different droplet sizes were carried out in Mali in 1989.

Studies to determine the effect of height of pesticide emission on efficiency/effectiveness were carried out by FAO in cooperation with DLCO-EA in Kenya in 1990.

6. Remote Sensing

A research study to produce an atlas of the breeding habitats of the Desert Locust during plagues and recessions has been undertaken using remote sensed products, with funding from the Government of Belgium. It is anticipated that the Atlas will be published in early 1991.

Further research in collaboration with the Remote Sensing Division (AGRT) of FAO has also been undertaken and details are attached.

A pilot study for mapping biotopes of African Migratory Locust in South-Western Madagascar using remote sensing has been completed. The study was carried out by the Technical University of Berlin and financed by FAO (TCP).

A further pilot study was carried out in Mauritania which examined actual ecological conditions and satellite imagery in relation to Desert Locust. This study was carried out through an FAO Fellowship funded from the North-West African Commission.

INTEGRATION OF REMOTE SENSING TECHNIQUES FOR SUPPORTING DESERT LOCUST MONITORING AND FORECASTING

1. INTRODUCTION

The FAO Remote Sensing Centre (AGRT) is providing the Emergency Centre for Locust Operations (ECLO) with routine satellite based products through the operational ARTEMIS system. As endorsed by the recommendations of the Research Meeting on Desert Locust Forecasting and Population Dynamics, FAO Rome, March 14-16 1989, prior to the 30th Session of the DLCC, June 1989, several activities and studies were carried out for ground truthing and calibration of the satellite data and to ensure further integration of remote sensing information in the ECLO data flow.

In this paper the operational and routine products are summarized and a brief overview of the research activities is given.

2. OPERATIONAL REMOTE SENSING PRODUCTS AS USED BY ECLO

Products available through the operational ARTEMIS system at FAO RSC:

a) Precipitation assessment

- ten-day and monthly cold cloud duration (D/MCCD) maps for the continent of Africa and the Near East, based on hourly Meteosat infrared data.
- ten-day and monthly estimated rainfall (D/MERF) maps of the Southern Sahara, Sahel, Sudanian and tropical countries of West Africa, obtained through regression relationships between CCD and ground observed rainfall.
- ten-day and monthly estimated number of rainfall day (D/MNRFD) maps for Africa and the Near East.

b) Vegetation monitoring

- ten-day and monthly NOAA AVHRR GAC based composite vegetation index (D/MNDVI) maps for Africa, southern Europe, the Near East and southwest Asia.

All the above products have a spatial resolution of 7.6 km and are delivered to ECLO both as photographic product and as digital data in IBM PC compatible format.

- ten-day NOAA AVHRR HRPT based composite vegetation index maps for the Desert Locust recession area of West Africa.

This product has a spatial resolution of approximately 1.1 km and has been operationally available during the breeding seasons from August 1989.

These data are routinely used by the ECLO staff together with other incoming information, such as field reports, Bracknell meteorological data, weather charts from the FAO Agrometeorology Group etc., to assess the locust situation and to prepare forecasts.

3. RESEARCH FOR IMPROVEMENT AND INTEGRATION OF RS DATA

- a) The Diana satellite telecommunication link between FAO headquarters and the field in Africa, the Near and Middle East, as developed by the European Space Agency (ESA) in

cooperation with FAO, will enter its field test phase in October 1991. Based on the initial results, the system can be operational by July 1992. Through this PC-to-PC space link, the ARTEMIS and other relevant data will be readily available to the users on a real time basis.

b) To test and improve the validity of the NOAA AVHRR HRPT based vegetation index, a joint AGRT-ECLO field study was set up for verification, calibration and reliability testing of various NOAA HRPT vegetation indices, during summer-autumn 1989. This study has been financed from project ECLO/INT/004/BEL as follow up of the recommendation of the research meeting in March 1989. The chosen study area was the Central Tamesna in Niger.

(i) Discussions and results are as follows (Charlet, Di Gregorio, FAO report in print):

- spectral discrimination of vegetation: The field data show a different behaviour of ephemeral vegetation related to its Leaf Area Index. The NDVI (Normalized Difference Vegetation Index) or ratio (Infrared/red) are reliably distinguishing vegetation/non-vegetation and allow also discrimination between the pure plant associations. A statistical representation for ideal vegetation types has been built up to relate this information closer to the field situation and to use in the calibration model.
- using high resolution Landsat data, various vegetation indices were tested. The Perpendicular Vegetation index (Richardson and Wiegand, 1977) seems the most reliable one. The ratio red/infrared, and NDVI have an identical comportment, but the ratio allows finer distinction of the low cover vegetation. Its easier computing makes it advisable to use this index for routine monitoring.
- through multi-temporal and multi-resolution analysis of the satellite data, a calibration scheme for the NOAA AVHRR HRPT data was proposed and tested. A land unit stratification map contains the different calibrating factors, initially based on soil brightness and spectral behaviour of plant associations through time. The resultant calibrated index contains the maximum information for low cover vegetation and is typical per land unit.
- introduction of a Geographic Information System (GIS) makes the calibration a dynamic feature in the sense of continuous update possibilities through additional information coming from the field. A standardized background database contains all relevant data about the specific landunits. It allows for easy modelling, using the calibrated vegetation index and precipitation estimates and reports, for the routinely detection and monitoring of suitable breeding areas.

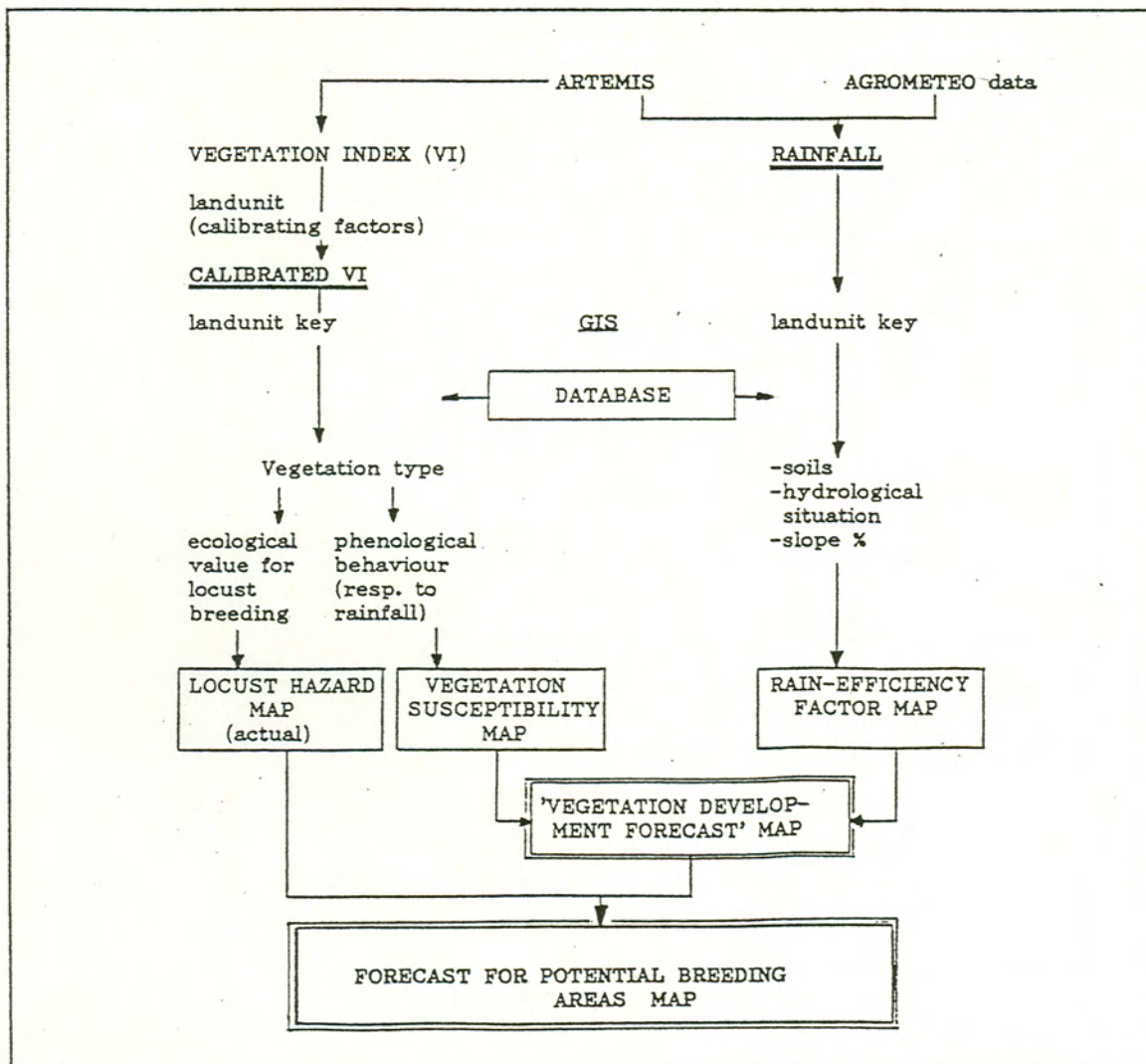
(ii) Further requirements here are:

- adoption of a standardized field relevee form to update maps and databases in a uniform way;
- extension of the initial landunit stratification, over the whole recession area;
- full integration of the ARTEMIS precipitation data and the real meteo data as available through the FAO Agrometeorological Group, AGRT;
- full cooperation and complementarity with the planned UK GIS development project;
- testing and improving proposed integrated RS model .

(iii) All applications are developed bearing in mind the use of IBM compatible PC's usable in the field on a local scale. ECLO is equipped with a dedicated PC and printer, comprising an Image Display software. Further update will be an ILWIS GIS system. ECLO staff is being trained on the use of the software and equipment.

c) Upon a recent request of the IRLCO-CSA for supporting red locust monitoring using satellite data, a feasibility and cost/benefit study is planned to evaluate the possibilities and reliability for the use of such data over the small breeding zones in Zambia and Tanzania.

fig. Proposal for Remote Sensing - GIS locust monitoring model



INTERNATIONAL TRUST FUND 9161
CONTRIBUTIONS AND EXPENDITURES

Financial Report

1. The above Trust Fund was established by the Director-General of FAO following the recommendations of the Ninth Session of the Desert Locust Control Committee. The Director-General, as Administrator of the Trust Fund, consults with the Desert Locust Control Committee which is responsible for the general policy guidance of the Trust Fund; the Committee also reviews the annual budget and receives financial reports from FAO.

Budget, Statement of Accounts for 1989 and 1990

2. The annual budget of the Trust Fund is shown in Appendix A, together with the accounts for 1989.

3. The total expenditure in 1989 amounted to US\$ 26,779. The overall end-of-year position for 1989 showed a balance of US\$ 200,053. The level of expenditure in 1989 was considerably lower than the budget of US\$ 207,000 as the locust activities were mainly financed through the Locust Emergency projects. The same applies to the expenses incurred so far during 1990. The activities of 1990 concentrated on the Technical Advisory Committee Meeting which was held in FAO HQ during June 1990. The present estimated balance for 1990 amounts to US\$ 263,387.

Budget and Accounts for 1989 and 1990

4. A breakdown of expenditures and commitments for 1989 and provisional expenses up to the end of July 1990 are also given in Appendix B.

Contributions

The scale of Government contributions to the Trust Fund is given in Appendix C. Details of outstanding contributions as of 30 June 1990 are given in Appendix D.

INTERNATIONAL TRUST FUND 9161

Budget and Statement of Accounts (in US\$)

Receipts	Approved Annual Budget	Expenditures 1989	Commitments/ Expenditures as of 31.7.90
Balance brought forward from previous year		92,278	200,053
Contributions from member countries (incl. interest)	207,300	134,554	104,638 1)
TOTAL	207,300	226,832	304,691
<u>Expenditures</u>			
10. Personnel Services	40,000	8,945	263
20. Travel	23,000	12,264	31,494
30. Contractual Services	20,000	1,427	4,000
40. General Operating Exp.	5,000	1,062	795
50. Supplies	10,000	-	-
60. Equipment	35,000	-	-
80. Fellowships, Training	50,000	-	-
90. Project servicing costs (13%)	23,790	3,081	4,752
TOTAL Expenditure	206,790	26,779	41,304
Unallocated balance	510	200,053	263,387

1) Data as of 30/6/90

INTERNATIONAL TRUST FUND 9161

Breakdown of 1989 expenditures and commitments as of 31 July 1990

	Expenditures 1989	Commitments/expendit. as of 31.7.90
10. <u>Personnel Services</u>		
Consultants (pesticide trial programme NER, study on technical needs MAU/NER/MLI ALG/MOR, preparation of working papers on Desert Locust research)	11,121	263
Temporary Assistance	6,645	
Refund against previous temporary charge of Expert on Migrant Pests	-8,821	
TOTAL	8,945	263
20. <u>Travel</u>		
Non-staff		
- training course, Montreux (88)	3,069	
- meeting on pesticides (88)	3,445	
- OCLALAV Conseil d'Admin., Mali (88)	2,225	
- Algerian Meteorologist (FAO HQ)	7,318	
- Meeting of Experts on Pesticide Application, Jan 89	1,259	
- Tech Advisory Committed of DLCC June 1990		25,013
- DLCC Meeting, Sept 90		5,102
- miscellaneous	1,463	518
- credits meetings 1988	-10,537	
Staff Travel		
- Headquarters staff	4,022	861
TOTAL Travel	12,264	31,494
30. <u>Contractual Services</u>		
- Publications (Committee documents)	1,427	4,000
		.../...

40. <u>General Operating Expenses</u>		
- Hiring of vehicle (Mauritania)	975	
- Miscellaneous	87	795
	<hr/>	
TOTAL	1,062	
90. <u>Project Servicing Costs</u>	23,698	4,752
	<hr/>	
GENERAL TOTAL	26,779	41,304

SCALE OF GOVERNMENT CONTRIBUTIONS TO THE
INTERNATIONAL DESERT LOCUST TRUST FUND
No. 9161 (MTF/INT/008/MUL)

<u>COUNTRY</u>	<u>SCALE (US\$)</u>
Afghanistan	3,480.00
Algeria	7,700.00
Bahrain	920.00
Cameroon	2,780.00
Chad	3,520.00
Djibouti	1,120.00
Egypt	5,740.00
Ethiopia	4,320.00
Gambia	2,420.00
Ghana	3,280.00
India	20,000.00
Iran	20,000.00
Iraq	7,440.00
Jordan	3,420.00
Kenya	3,580.00
Lebanon	3,060.00
Libya	10,640.00
Mali	3,600.00
Mauritania	2,900.00
Morocco	5,360.00
Niger	3,760.00
Nigeria	8,940.00
Oman	2,100.00
Pakistan	6,520.00
Qatar	1,760.00
Saudi Arabia	20,000.00
Senegal	3,520.00
Somalia	3,500.00
Sudan	3,980.00
Syria	4,520.00
Tunisia	4,460.00
Turkey	14,480.00
Uganda	3,380.00
United Arab Emirates	4,600.00
Yemen Arab Republic	3,580.00
Yemen, P.D.R.	2,920.00
TOTAL	207,300.00

TRUST FUND No. 9161.00 (MIF/INF/008/MUL)
INTER-REGIONAL DESERT LOCUST CONTROL PROJECT

STATUS OF CONTRIBUTIONS AS 30 JUNE 1990 (1)
(provisional)

(expressed in US Dollars)

Member Governments	Oustanding 1976/89	Contributions due for 1990/91	Received up to 30/6/90	Oustanding 30/6/90
AFGHANISTAN	22,450.00	3,480.00	22,450.00	3,480.00
ALGERIA	46,200.00	7,700.00	0.00	53,900.00
BAHRAIN	920.00	920.00	0.00	1,840.00
CAMEROON	14,347.00	2,780.00	0.00	17,127.00
CHAD	37,240.00	3,520.00	0.00	40,760.00
EGYPT	5,740.00	5,740.00	5,740.00	5,740.00
ETHIOPIA	31,460.94	4,320.00	0.00	35,780.94
FRANCE (DJIBOUTI)	9,940.00	1,120.00	0.00	11,060.00
GAMBIA	16,940.00	2,420.00	0.00	19,360.00
GHANA	23,915.94	3,280.00	23,900.94	3,295.00
INDIA	50,000.00	20,000.00	0.00	70,000.00 2)
IRAN	141,800.00	20,000.00	0.00	161,800.00
IRAQ	52,080.00	7,440.00	0.00	59,520.00
JORDAN	10,260.00	3,420.00	3,420.00	10,260.00
KENYA	26,134.41	3,580.00	0.00	29,714.41
LEBANON	14,669.27	3,060.00	40.30	17,688.97
LIBYA	35,560.00	10,640.00	0.00	46,200.00
MALI	8,413.00	3,600.00	0.00	12,013.00
MAURITANIA	31,925.09	2,900.00	0.00	34,825.09
MOROCCO	5,340.00	5,360.00	0.00	10,700.00
NIGER	28,120.00	3,760.00	0.00	31,880.00
NIGERIA	22,669.61	8,940.00	0.00	31,609.61
OMAN	8,400.00	2,100.00	0.00	10,500.00
PAKISTAN	6,520.00	6,520.00	6,520.00	6,520.00
QATAR	11,390.00	1,760.00	0.00	13,150.00
SAUDI ARABIA	20,000.00	20,000.00	20,000.00	20,000.00
SENEGAL	27,206.52	3,520.00	0.00	30,726.42
SOMALIA	23,774.77	3,500.00	0.00	27,274.77
SUDAN	1,305.70	3,980.00	0.00	5,285.70
SYRIAN ARAB REP	37,670.00	4,520.00	0.00	42,190.00
TUNISIA	17,996.44	4,460.00	0.00	22,456.44
TURKEY	14,480.00	14,480.00	14,422.08	14,537.92
UGANDA	16,900.00	3,380.00	0.00	20,280.00
UNITED ARAB EM.	13,800.00	4,600.00	4,576.20	13,823.80
YEMEN ARAB REP	3,580.00	3,580.00	3,568.00	3,592.00
YEMEN, P.D.R.	18,120.00	2,920.00	0.00	21,040.00
	<u>857,268.59</u>	<u>207,300.00</u>	<u>104,637.52</u>	<u>959,931.07</u>

1. Turkey joined the Committee at the beginning of 1988 and was requested to pay the contribution as from 1 June 1989 for the financial year 1989/90.
2. On 18/7/90 the Government of India authorized the payment of US\$ 20,250.

STATUS OF REGIONAL LOCUST COMMISSIONS AND ORGANIZATIONS

1. FAO Commission for Controlling the Desert Locust in the Near East

The sixteenth Session was held on 30 October-1 November 1989 in Doha, Qatar with the participation of seven Member Countries.

The seventeenth Session was held on 4-7 June 1990 in Cairo, Egypt with the participation of ten Member Countries. Topics which were discussed included:

- the current Desert Locust situation in the region;
- provision of assistance to Oman for control;
- proposals for a Desert Locust Preventive Control programme in the region;
- the proposed transfer of the seat of the Commission to Cairo;
- research, training and cooperation;
- the programme of work and budget.

2. FAO Commission for Controlling the Desert Locust in North-West Africa

The sixteenth Session was held on 5-9 March 1990 in Tunis and was attended by all Member Countries. The Commission:

- reviewed the Desert Locust situation in the region, which was assessed as calm;
- reviewed the activities of the Maghreb Task Force and formulated a programme of work for the Task Force in 1990;
- requested FAO to consider strengthen of the Commission by provision of additional staff;
- reviewed the proposed Inter-Regional Preventive Control project;
- reviewed the problems of pesticide storage and disposal in the region.
- reviewed training, research and cooperation activities (especially with West Africa);
- approved the programme of work and budget.

The seventeenth Session is scheduled to be held in September 1991 at Rabat, Morocco.

3. FAO Commission for Controlling the Desert Locust in the Eastern Region of its distribution area in South-West Asia

The eighteenth Session is provisionally scheduled to be held in April 1991 in New Delhi, India.

4. The Desert Locust Control Organization for Eastern Africa (DLCO-EA)

The 34th Regular Session of the DLCO-EA Council of Ministers was held in Addis Ababa, Ethiopia from 22-24 June 1989.

The 35th Regular Session of the DLCO-EA Council of Ministers was held in Kampala, Uganda from 25-26 June 1990 with the participation of all Member Countries and observers from FAO, ODA/NRI, GTZ and IRLCO-CSA.

The Council

- reviewed the migrant pest situation in the region;
- reviewed the Scientific Research Programme, Projects and the status of donor assistance;
- reviewed the programme of work and budget;
- discussed the ODA Management Review of DLCO-EA and recommended that a Special Council Session be convened in September 1990 to further discuss the report.

5. Organisation commune de lutte antiacridienne et de lutte antiaviaire (OCLALAV)

Major ongoing activities in 1989-90 comprised the following:

Coordination

- collection of locust and environmental information;
- analysis of information;
- collation of locust information and distribution of regular bulletins;
- organisation of technical meetings for member States.

Short term training

- training of Plant Protection officers;

Research

- determination of effective pesticide dose rates;

Technical and Financial Assistance

- spraying equipment;
- radio transmitters/receivers;
- participation in surveys.

6. International Red Locust Control Organisation for Central and Southern Africa (IRLCO-CSA)

The nineteenth Ordinary Session of the Governing Council was held at Arusha, Tanzania from 26-27 October 1989.

The Council

- reviewed the locust and other migratory pest situation in the region. The locust situation was judged to be under control;
- reviewed the organisational structure and proposed changes to existing staff and financed regulations;
- reviewed the proposed programme of work for 1990 and the budget together with the status of requests for donor assistance;
- elected a new Director (Mr. E. Byaruhanga).