

REPORT OF THE

**Held in Rome
3-7 November 1980**

TWENTY-FOURTH SESSION OF THE FAO DESERT LOCUST CONTROL COMMITTEE



FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Meeting Report No.
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R E P O R T O F
THE TWENTY-FOURTH SESSION OF THE
FAO DESERT LOCUST CONTROL COMMITTEE

held in

Rome, Italy
3 - 7 November 1980

Plant Production and Protection Division
Food and Agriculture Organization of the United Nations
Rome, 1980

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INTRODUCTION

The Twenty-Third Session of the FAO Desert Locust Control Committee, which was held in Rome on 7 - 11 May 1979, recommended that the next Session of the Committee should be convened in Rome in October 1980, unless the desert locust situation deteriorated, in which case it was to take place in late 1979. As the locust situation was calm in late 1979, the Director-General invited the following Governments to be represented at the Twenty-Fourth Session:

Afghanistan	Morocco
Algeria	Niger
Bahrain	Nigeria
Benin	Oman
Cameroon	Pakistan
Central African Rep.	Portugal
Chad	Qatar
Djibouti	Saudi Arabia
Egypt	Senegal
Ethiopia	Sierra Leone
France	Somalia
Gambia	Spain
Ghana	Sudan
Guinea	Syria
India	Tanzania
Iran	Togo
Iraq	Tunisia
Israel	Turkey
Ivory Coast	Uganda
Jordan	United Arab Emirates
Kenya	United Kingdom
Kuwait	United States of America
Lebanon	Upper Volta
Libya	Yemen, Arab Republic
Mali	Yemen, People's Democratic Republic
Mauritania	

He also invited the representatives of the Desert Locust Control Organization for Eastern Africa (DLCO-EA), l'"Organisation Commune de Lutte Antiacridienne et de Lutte Antiaviaire" (OCLALAV), the International African Migratory Locust Organization (OICMA), the International Red Locust Control Organisation for Central and Southern Africa (IRLCO-CSA), the League of Arab States and the Arab Organization for Agricultural Development as observers. In addition, he invited the representatives of the United Nations Development Programme (UNDP) and the World Meteorological Organization (WMO) because of their continued interest in the Desert Locust Programme.

The Session was opened by Dr. D.F.R. Bommer, Assistant Director-General, Agriculture Department who, on behalf of the Director-General of FAO, welcomed the participants to the Session and briefly reviewed the more important developments in the locust situation since the previous Session held in May 1979.

He stated that, because of the international significance of the Desert Locust problem, great interest was displayed by governments of affected countries and international organizations and donors. This was reflected in the participation of the International Red Locust Control Organisation for Central and Southern Africa (IRLCO-CSA) for the first time.

Dr. Bommer drew attention to the recognition by all parties concerned of the need for a long-term approach to the locust problem and for the establishment of strong and well-equipped national plant protection services. This awareness had resulted in the establishment of an Action Programme for Improved Plant Protection, for which FAO had been requested to act as the main coordinator. He further noted that one of the problems of coordination was financial and that the need had arisen for a careful review of the scale of contributions to the International Trust Fund for the control of the Desert Locust. He pointed out that its annual income had decreased since its establishment in 1964 and requested that a special effort be made to remedy this situation.

Dr. Bommer also informed the Committee that the Reporting and Forecasting Service had been established at Headquarters and that FAO was developing the use of Remote Sensing to detect potential desert locust breeding sites. He also mentioned the need to find alternative insecticides and suggested that the meeting might consider the use of developing biological control methods. He further mentioned FAO's assistance to the possible merger between OCLALAV and OICMA and to the management study of DLCO-EA.

Finally, Dr. Bommer informed the Committee that, although the DLCC is specifically restricted to activities concerning the Desert Locust, many of the countries are also concerned with other migratory pest species and there had been an upsurge of the African Migratory Locust in the Lake Chad Basin in 1979-80 which had necessitated emergency operations in Cameroon, Nigeria and Chad in order to prevent a new plague. He concluded by saying that the ultimate goal was to avoid, as far as possible, losses in agricultural production and that this would require continuous efforts from all DLCC member countries.

Officers of the Session

Chairman: Sadok Allaya (Tunisia)
Vice-Chairman: Hussein Elmi Amir (Djibouti)

Drafting Committee

The Delegates of Algeria, Kenya, Pakistan and Saudi Arabia, the FAO Secretariat and Mr. R.M. Skaf acted as Technical Secretary.

Acknowledgements

The Delegates expressed their appreciation and thanks to the Chairman for the way in which he conducted the deliberations of the Session and for his cooperative attitude which facilitated full and frank discussions. They also thanked the FAO Secretariat for carrying out their duties efficiently and welcomed the appointment of Mr. R.M. Skaf as Senior Officer in the Locusts, Other Migratory Pests and Emergency Operations Group at FAO Headquarters.

Obituary

The Delegates expressed their deep regret at the passing away of Mr. Mohamed Hussein and Mr. Selwyn Watts.

Mr. Mohamed Hussein was one of the pioneers in locust control. As a member of the Ministry of Agriculture in Cairo, he made one of the earliest surveys for desert locusts in the Arabian Peninsula in 1937. Subsequently, he led Egyptian Anti-Locust Missions in the peninsula. In 1959 he joined FAO and served as Regional Locust Officer (Arabian Peninsula), based at the International Locust Centre in Jeddah until his separation in 1963.

Mr. W. Selwyn Watts was a member of the Centre for Overseas Pest Research, London. His early work was concerned with the laboratory testing of chemicals for their toxicity to locusts. An important finding was the carry-over effect of sub-lethal doses of dieldrin into the next generation. More recently Mr. Watts had been responsible for organizing technical aspects of programmes for visiting fellows, trainees and research scientists.

PARTICIPANTS IN THE SESSION

The following delegations from Member Nations of the Food and Agriculture Organization of the United Nations, the United Nations and Specialized Agencies, observers and members of the FAO staff participated in the Session and contributed to the discussions summarized in this report.

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A G E N D A

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. Desert Locust Situation Summary May 1979 - October 1980 and Forecast up to 31 December 1980
6. Anti-Locust Measures undertaken by Various Countries and Regional Organizations (May 1979 - October 1980)
7. Assistance provided to Countries and Regional Organizations, February 1978 - October 1980 (FAO and Donors)
8. Review of the Existing Control Potential at National and Regional Levels
9. Reporting and Forecasting
10. Review of Remote Sensing Applications to Desert Locust Survey and Control and Suggestions for Further Activities
11. Review of Work at Desert Locust Field Research Stations, and Suggestions for Further Activities
12. Coordination with UNDP/FAO Action Programme for Improved Plant Protection
13. Training Programmes - Needs and Proposals
14. Trust Fund 9161 - Contributions and Expenditure
15. Status of Various Desert Locust Regional Organizations:
 - (a) South-West Asia
 - (b) Near East
 - (c) Eastern Africa
 - (d) North-West Africa
 - (e) West Africa
16. Any Other Business
17. Date and Place of Next Session
18. Adoption of the Report

SUMMARY OF DISCUSSIONS

The Desert Locust Situation Summary, May 1979 - October 1980, and Forecast up to 31 December 1980

1. The Committee reviewed the Desert Locust situation from May 1979 to October 1980 (Appendix I). It noted with satisfaction that the chemical control measures undertaken in late 1978 and early 1979 had prevented the upsurge from developing into a major plague. As a result the last gregarious populations of the upsurge were eliminated by March 1979.
2. During the summer of 1979 only scattered adults and small-scale breeding were recorded. There was widespread rainfall in Red Sea coastal areas of Sudan and Egypt in late October 1979 which gave rise to very favourable breeding conditions. Control measures commenced in Sudan in January 1980 and extended to south-eastern Egypt and northern Saudi Arabia in April and May. Some hopper bands and swarms were formed on the western side of the Red Sea but by June the infestations were completely cleared.
3. In West Africa there was widespread rainfall in north-east Mali, northern Niger and southern Algeria between June and early October 1980 which resulted in the creation of very favourable breeding conditions. There then followed a very rapid increase in numbers and gregarisation and the formation of hopper bands and swarms in late September and early October, and there was evidence that some swarms had already left the breeding areas. Control operations commenced in July and by the end of October 4 536 hectares had been treated in Mali with 4 650 litres of 5% dieldrin, but another 10 000 hectares remained to be treated. In Niger a total of 77 740 hectares had been treated by aircraft and exhaust nozzle sprayers up to 31 October and another 20 000 hectares remained to be treated. In southern Algeria 6 720 hectares had been treated up to 28 October.

Summary of Forecast up to 31 December 1980

4. The most important populations are in north-west Niger, north-east Mali and southern Algeria, where hopper bands and swarms have already formed. Unless survey and control teams are able to locate and destroy all major infestations, further swarms will be produced. These are likely to move north-west and could reach southern Morocco and many parts of Algeria south of 30° N. Some swarms could subsequently move to Mauritania and others to western Libya and, possibly, as in November 1954, to other parts of Libya and even Egypt. Some populations could remain in the southern Sahara and further breeding is possible in areas where ecological conditions remain favourable.

5. In the Central Region numbers of adults are likely to increase in coastal areas bordering the Red Sea and Gulf of Aden. Breeding will start in areas which received summer floods or which receive early winter rain, but initially it will probably be only at low density.
6. In the Eastern Region small numbers of adults are likely to reach Las Bela district and the Mekran of Pakistan and some may reach south-eastern Iran. Small numbers may persist in Rajasthan in India and the adjacent desert areas of Pakistan.
7. Noting that potentially dangerous upsurges and gregarisation had occurred on two further occasions following widespread rainfall in areas around the Red Sea and in the Southern Sahara, the Committee underlined the need for every-ready survey and control teams, capable of locating all significant infestations within areas where it has rained or where conditions are favourable for breeding. This requires that the teams should be well-equipped and trained.

Anti-Locust Measures Undertaken by Various Countries and Regional Organizations (May 1979 - October 1980)

8. The anti-locust measures which had been undertaken during the period May 1979 to October 1980 are shown in Appendix II. They were based on information provided in monthly summaries, supplemented by information provided by Delegates.

Assistance Provided to Countries and Regional Organizations, February 1978 - October 1980 (FAO and Donors)

9. Emergency assistance provided to countries and regional organizations by FAO and donors during 1978-1980 is summarized below:

Assistance provided by, or through, FAO

FAO Technical Cooperation Programme (TCP)	\$1 350 000
FAO Working Capital Fund (WCF)	\$ 350 000
International donor contributions through FAO	<u>\$6 901 979</u>
	<u>\$8 601 979</u>

International donor contributions, through FAO

The following contributions were received:

<u>Source</u>	<u>US \$</u>	
Belgium	205 810	
Canada	174 718	
Denmark	640 000	in kind
Germany, Federal Republic (FFHC)	200 000	
Netherlands	506 397	
Norway	190 715	
Saudi Arabia	500 000	
Sweden	224 570	
U.K. (part of bilateral assistance to DLCO-EA)	176 000	in kind
UNDP	150 000	
UNDP (savings on RAB 75/010)	20 000	
UNDP/OPEC Special Fund	1 345 000	
EEC	1 718 769	
BADEA (Niger and OCLALAV)	800 000	
BADEA (DLCO-EA)	50 000	
	<hr/>	
	6 901 979	
	=====	

Assistance under TCP was provided to Djibouti (\$100 000), India (\$250 000), Pakistan (\$200 000), Somalia (\$200 000), Sudan (\$250 000), Yemen Arab Republic (\$250 000) and the People's Democratic Republic of Yemen (\$100 000). The breakdown of expenditure under these funds in the form of equipment, vehicles and pesticides distributed to various countries is given in Appendix III.

Assistance provided under WCF was spent mainly for equipment and supplies to DLCO-EA and a small amount went to the Yemen Arab Republic. Breakdown of expenditure under WCF is shown in Appendix IV.

Equipment, pesticides, vehicles, radio sets and other miscellaneous items provided to various countries from international donor contributions are given in Appendix V, and those supplied under UNDP/OPEC Special Fund are shown in Appendix VI.

Some of the supplies have still not arrived at their destination and individual cases are being followed up.

10. In addition, UNDP assistance in the field of Desert Locust control consisted of financing the following projects:

RAB 75/010: Yemen Arab Republic and People's Democratic Republic of Yemen (1978-80)	\$573 853
RAF 77/048: OCLALAV (1979-80)	\$237 000

11. Furthermore, the Governments of the Yemen Arab Republic and the People's Democratic Republic of Yemen, having approved the continuation of the locust projects in the 1982-86 UNDP budget cycle in their IPF for a period of three years, UNDP agreed to finance 1981 costs of the project in order to avoid any interruption.

12. Bilateral assistance was provided as follows:

(i) France continued its assistance to OCLALAV by providing services of technical advisers, pilots and mechanics on a permanent basis with additional pilots and mechanics on a seasonal basis. The amount of this assistance is around US\$500 000 per year.

(ii) DLCO-EA received substantial assistance from the following donors:

UK : £ stg. 1 000 000 provision of four Britten Norman Islander aircraft and spray gear

USAID : \$100 000 for procurement and air freight of 20 000 litres Malathion ULV
\$225 000 in cash for hire of helicopters
\$ 75 000 in cash for procurement of aviation fuel
\$165 000 technical assistance from USDA

IFAD : \$180 000 in cash for meeting operational costs

EEC : \$300 000 in cash for meeting operational costs

Germany : D. Marks 200 000 as contribution to the Emergency Fund.
(FRG)

In addition, a USAID/UK/FAO Management Consultant Team made a thorough review of the organizational structure, finance and budget of DLCO-EA. The results of this review were accepted by the Governing Council of DLCO-EA and are being implemented.

(iii) Saudi Arabia's assistance to Yemen Arab Republic amounted to approximately \$300 000 in the form of insecticides.

(iv) Iraq reiterated its offer of two agricultural aircraft to assist in Desert Locust control operations, preferably in the Arabian Peninsula. The use and destination of the assistance will be at the discretion of FAO in consultation with the Government of Iraq.

13. Delegates of member countries and regional organizations thanked FAO and donors for the assistance received. The Committee emphasized the necessity of continuing assistance to maintain control capabilities and research at an adequate level of efficiency. The need to provide OCLALAV with insecticides was particularly mentioned. This latter Organization, due to the absence of major infestations during the last upsurge in the Western Region, had received almost no pesticides from Emergency Funds in 1978-80; furthermore, it had had to spend a lot of its own reserves and those of Niger to control incipient bands and swarms in August - October 1980. All efforts should be made to replenish OCLALAV stocks of pesticides as soon as possible.

Review of the Existing Control Potential at National and Regional Levels

14. In order to assess the available means for locust control in affected or threatened areas and to evaluate future needs, FAO tries to keep an up-to-date record of control potential in various countries and organizations. Such a record is given in Appendix VII.
15. The Committee noted that the information on application equipment and vehicles in several cases relates to both locust control and general plant protection, and that some of the vehicles are quite old and will soon be out of service. It should also be kept in mind that the position of the stocks of insecticides is changeable. The Committee considered that the level of present control potential in the Desert Locust invasion area is adequate in most countries.
16. The Committee learnt with interest that the Yemen Arab Republic had recently established a locust control section in the Ministry of Agriculture with an annual running budget of Rials 100 000, equivalent to US\$40 000. The United Arab Emirates had also established a plant protection section since 1979 with an annual budget of Dirhams 2 million, equivalent to US\$600 000, which permitted the purchase of vehicles and equipment; it is hoped that this measure will greatly help to start locust control activities. The Committee was informed that the Commission for Controlling the Desert Locust in the Near East, at its Eleventh Session held in Amman, decided to finance a post for a locust officer in the United Arab Emirates for one year at the expense of Trust Fund 9409. The Commission emphasized that arrangements would have to be made with the Government of the United Arab Emirates to finance this post after the initial one year period.

Reporting and Forecasting

17. The Committee, endorsing the present strategy of Desert Locust plague prevention, which is based on the timely detection and control of populations before they cause significant crop damage, recognized the key role of an effective and efficient reporting and forecasting service. It recognized that such a service depended upon the prompt and regular transmission of locust and environmental data by the most appropriate means.
18. The Committee appreciated the services presently rendered, and the transmission of urgent information, or warnings by telex or cable, but noted that there were certain deficiencies in the present system:
 - there were delays in the reception of information from the field at regional and interregional levels;
 - there were delays in the reception of Foodagrams and the Monthly Situation Summary and Forecast.
19. The Committee recommended that:
 - the reporting and forecasting facilities should be strengthened at both regional and interregional (Headquarters) levels;
 - there should be improved radio communications between countries;

- telex messages or cables should be sent whenever the situation requires;
- the Headquarters service reduce delays in printing and distribution of the Monthly Summary and Forecast;
- every effort be made to obtain additional funds in order to strengthen the reporting and forecasting services at all levels.

20. The Committee further formed a Working Group during the Session to examine the best means of improving the reporting and forecasting system. The following are the main recommendations of the Working Group:

- The present system of reporting and forecasting as outlined in the Working Document, AGP:LCC/80/8, should form the basis of the future reporting and forecasting system, but concluded that there should be some modifications.
- Regional organizations and commissions should receive summaries of the monthly situation from each country within the Region by radio, telephone, telex as appropriate within two - three days of the end of the month for transmission to FAO Headquarters and adjacent countries and regions.
- Regional organizations and commissions should prepare 7-, 10- or 15- day situation summaries during recessions, upsurges and plagues; summaries of the major locust and weather developments should be sent by telex, through the appropriate UNDP/FAO office. These should be followed up by the full summaries and the detailed reports to be sent by pouch.
- The present system of sending foodagrams to many addressees around the eighth of each month should be replaced by the sending of telex messages or cables which should include both locust and weather information of significance to the regional organizations/commissions; foodagrams would continue to be sent to other addressees.
- The distribution of such information should be revised according to the overall level of locust infestations; it being recognized that operationally it was necessary for the threatened or potentially threatened countries to receive current information as soon as possible.

These were adopted by the Committee.

21. The Committee wished to express its appreciation to WMO for providing the services of a synoptic meteorologist during 1979 and, recognizing the need for such a specialist for the efficient and effective running of the locust reporting and forecasting service, noted with satisfaction that FAO had already taken steps to obtain the services of a synoptic meteorologist.

Review of Remote Sensing Applications to Desert Locust Survey and Control and Suggestions for Further Activities (Appendix VIII)

22. Following the successful demonstration of the significant potential of the use of satellite remote sensing technology for improving desert locust surveillance and control during a pilot project carried out by FAO in North-West Africa (1976/77), a larger scale project for development and implementation of a largely satellite based information and early warning system, to be integrated in the existing international desert locust plague prevention programme at various levels, was prepared. Phase I of the three-year development project started in October 1979 with funding (US\$150 000) for nine months from the Government of the United States of America through USAID.

23. The Committee reviewed the results and achievements of Phase I. During this phase, emphasis was placed on the development of suitable remote sensing techniques for detection and monitoring of the main ecological parameters for desert locust population development. Various techniques are now available for operational implementation. Remote sensing data utilization infrastructure development was undertaken at a regional level in North-West Africa and national levels in India and Pakistan through the establishment of remote sensing laboratories in Algiers, Algeria and Jodhpur, India. Active working relationships were developed with remote sensing data receiving and processing facilities for the regular supply of various types of satellite data. The use of remote sensing data for desert locust habitat mapping is actively being developed on a regional scale in North-West Africa.

24. Phase II of the development project, prepared on the basis of the findings and experience gained during Phase I, will focus on implementation, operational field testing, infrastructure development in regions so far not covered by the project and training of national and regional staff in remote sensing with the objective to provide the various organizations responsible for the surveillance and control of the desert locust with their own experienced personnel in this field. Close cooperation will be developed with DICO-EA and OCLALAV regarding Phase II project activities in East and West Africa. The Phase II programme will also be closely integrated with the activities of the centralized desert locust reporting and forecasting service at FAO Headquarters and provide remote sensing inputs for this service to enable a better forewarning of important desert locust activity in the relevant FAO member countries and so to enable FAO to fulfil its coordinating role for the containment of this pest at the international level.

25. The Committee noted with great interest the results and achievements of Phase I of the remote sensing applications development project and considered that it was indispensable for this important programme to continue. It stressed the urgency of obtaining the required funding for Phase II and strongly recommended that FAO should approach donors as soon as possible for financing this extremely important programme.

Review of Work at Desert Locust Field Research Stations, and Suggestions for Further Activities

26. The Committee noted with concern that there had been an overall decline in the amount of research being undertaken at the field research stations, set up or strengthened

under the UN Special Fund (later UNDP) Desert Locust Project. It recognized that this was due to a number of factors, including shortage of specialized personnel and of field and laboratory equipment. It was also stated that there was a lack of proper coordination in drawing up and implementing research programmes and insufficient knowledge of what had been achieved and what work was currently in progress.

27. The Committee agreed that it was necessary to develop research programmes which should have the overall objective of finding the most effective and economic means of control, bearing in mind continual changes in the technology available. Because of constraints imposed by shortages of finance, manpower and equipment, it would be necessary to determine priorities and to present specific proposals in order to obtain adequate funding by individual governments.

28. Several priority areas were identified:

- improving means of surveillance and forecasting;
- improving control tactics and methods;
- continuation of research aimed at finding alternative insecticides to BHC and dieldrin;
- assessing the effects of control measures on the environment;
- further ecological and behavioural studies on solitary hoppers and adults in relation to environmental factors;
- training of personnel.

29. The Committee requested FAO to coordinate field research in order to provide a unified priority-oriented approach and to prevent repetition of what had already been done.

30. The Committee therefore recommended, in view of the importance which it attaches to research and development in the prevention of new Desert Locust plagues, that FAO should, in consultation with the governments of the affected countries and with other governments and institutes, prepare a plan for research on the Desert Locust at the various field stations which would be based on the priorities indicated in paragraph 28.

Coordination with UNDP/FAO Action Programme for Improved Plant Protection

31. The Committee heard with great interest a statement on the UNDP/FAO Action Programme for Improved Plant Protection, which started in January 1980 (Appendix IX). This Programme aims to strengthen plant protection capabilities in various countries - regions, including the effective control of migratory pests, in particular the Desert Locust (Report FAO/AGP/80/M/1). Member countries and regional locust control organizations (DLCO-EA), IRLCO-CSA, OCLALAV and OICMA) supported this project, which meets their common policy and approach of work.

32. The representative of the UNDP emphasized its long-standing interest in plant protection activities and its readiness to consider continued support and assistance within a broad and well-prepared scheme in which countries and organizations concerned, as well as other donors, could join their efforts. He emphasized the need for commitment and participation of governments. The Action Programme should not be considered as a

source of financial assistance, but as an activity to help governments set up comprehensive plant protection national programmes; these programmes could later be submitted by the governments concerned for assistance by various donors. Support to regional organizations was seen as a way of supporting the total Regional Action Programme. Because costs of supporting regional organizations were rising rapidly the UNDP will not be able to remain the main contributor and organizations will have to look for higher government contributions and other donor support.

33. The Committee recommended that the closest collaboration be established between all parties concerned and the Action Programme in order to strengthen locust control potential throughout the invasion area. It requested the Action Programme to undertake, as soon as possible, the proposed evaluation of locust control requirements in the DLCC area, with the participation of national plant protection services, regional plant protection and locust officers and regional locust control organizations.

34. In the course of discussions under the Action Programme, a number of countries requested that the mandate of the DLCC should be expanded to include other migratory pests, and at least other migratory locusts, and it was agreed that FAO would prepare a working paper for discussion at the next Session of the DLCC.

Training Programmes - Needs and Proposals

35. The Committee, in reviewing the activities under the Training Programme (Appendix X), expressed its appreciation to FAO for providing facilities for training courses and exchange visits. It noted that given the high cost of individual training, preference is now given by the Regional Commissions to group training and short-term training. It recognized that it was important that national and regional organizations should have properly trained personnel to make the best use of the various types of equipment, e.g. aircraft, radios, sprayers, which were necessary to undertake efficient and effective control measures and to have personnel adequately trained in surveillance, reporting and forecasting.

36. The Committee heard with interest that India was proposing to hold month-long Desert Locust field training courses in May and September of each year. The Delegate of Pakistan informed the Committee that services of pilot instructors could be made available for the training of agricultural pilots either in their own country or in Pakistan.

37. The Committee therefore recommended that the training programme be structured towards the provision of group training by appropriately qualified staff in fields directly applicable to the strengthening of national and regional survey and control capabilities and, in particular, to training in radio operation and maintenance, aerial spraying against locust infestations, ground survey techniques and reporting and forecasting.

Trust Fund 9161 - Contributions and Expenditure -
Proposals on Increasing the Fund and on New Scale of Contributions

38. The Committee was presented with a statement on the Budget, Statement of Accounts for 1979 and an Estimate for Expenditure for 1980 (Appendix XI). It was noted that heavy expenditure had been incurred in 1979 in order to maintain the activities of the remote sensing pilot project pending its coverage by funds from USAID and to cover extra expenses due to the emergency operations. As a result of this and because of late payment of contributions, the Fund has been in deficit during 1980 but recently US\$ 100 000 had been transferred from Emergency Assistance Funds.

39. The annual budget of the Fund, which was established in 1964, had remained at US\$ 100 000 but the total currently pledged had decreased to US\$84 608 (Appendix XII), not all of which is received regularly (Appendix XIII). Because of greatly increased costs the Trust Fund cannot now fulfil all of its objectives.

40. In order to overcome the problems created by inflation a paper presenting proposed new scales of contributions had been prepared based on a revised budget of US\$200 000 per annum (Appendix XIV), using the same criteria which had been used in calculating the contributions in 1964, i.e., frequency of desert locust infestations, susceptibility of crops to damage and the scale of the contribution of member countries to the United Nations (Appendix XV).

41. The Committee, while recognizing the need to increase the budget of the Trust Fund, requested FAO to prepare a full and clear statement explaining the new scale of contributions. This should then be forwarded to member governments for consideration and approval at the next session of the DLCC.

42. The Committee noted that in the original resolution adopted by the Ninth Session of the DLCC (1964) (paras. 77 - 78) which created the Trust Fund 9161, provision was made for "other governments, which are members of FAO and interested in the Desert Locust problem, to contribute to the Trust Fund; similar arrangements were also made for contributions from intergovernmental organizations, foundations, individuals and such other entities which are eligible to contribute to such funds as determined by the appropriate body or bodies, or FAO".

Status of the Various Desert Locust Regional Organizations

43. The Committee reviewed a document prepared by the Secretariat concerning the status of various regional Desert Locust control organizations. The document, as amended by including additional information received during the Session appears in Appendix XVI.

44. The Committee took note of the assistance provided by FAO (\$120 000) for the activities of an ad hoc Committee on the merger of OICMA and OCLALAV. A study had been prepared on the subject which will be considered by a joint meeting of the two organizations in January 1981 at Lomé.

45. The financial difficulties encountered at present by all regional locust control organizations were mentioned. All member countries concerned should be aware of the situation and try to find a quick solution. This problem was considered by the FAO Regional Conference for Africa (Lomé, June 1980), which adopted a resolution recommending strengthening plant protection and locust potential at national and regional levels.
46. The activities of the FAO Regional Commissions were appreciated by members concerned who recommended strengthening the Commissions in personnel, equipment and supplies.

Any Other Business

Biological Control

47. The Committee was informed that FAO had received two proposals for developing the use of microbial pathogens for grasshopper control and had passed on relevant information to various countries and organizations. The first concerned the use of the protozoan, Nosema locustae, which had been under test in the United States against rangeland grasshoppers. The Committee was informed that formulations of Nosema with the insecticide carbaryl and wheat bran had been field tested for a second consecutive year but that the results were not promising. It was also informed that the best results were obtained with formulations containing higher amounts of carbaryl.
48. The second pathogen was the fungus Entomophthora grylli, which is known to cause widespread and sometimes very heavy mortality under certain natural conditions, particularly warm, humid weather. Only recently was it possible to isolate the fungi in the form of protoplast which is known to be extremely fragile; it is not yet known whether the production of the resting spore, the only form imaginable for practical applications in the field, will be possible. Little is known about E. grylli concerning its mode of infection and behaviour. Experience gained after a long-term study by a large research team on E. obscurus for controlling aphids with resting spores of this fungus produced on a semi-industrial scale, indicates the enormity of funds and work involved before observing the activity of spores released in the field under various conditions. In all cases releases of spores would have to be made into each new infestation. This applies to locusts when all above developments will have been achieved. It will obviously be a long and costly research project.
49. The Committee noted with interest these new approaches of control, and in view of the effects of insecticides on non-target organisms and the environment, encouraged further research along these lines.
50. The Committee also wished to express its thanks to the developed countries for their continuing interest in the Desert Locust problem and for the technical knowledge which they were able to provide in these and similar matters.

Alternative Insecticides

51. At the request of the DLCC (22nd Session, July 1978 and 23rd Session, May 1979), FAO approached various potential donors in order to finance a continuation of the FAO/SIDA project (Research on other insecticides for locust control) which ended in September 1978. The Committee requested FAO to continue its efforts to obtain funding for this project and also to encourage member governments to undertake such research in their national research stations.

African Migratory Locust Upsurge

52. The Committee took note of an upsurge of the African Migratory Locust which arose in Lake Chad Basin outbreak area in late 1979 and caused an incursion of swarms in Cameroon and Nigeria in early 1980, followed by breeding. The Committee appreciated the emergency assistance provided by FAO, UNDP, U.K. and the Federal Republic of Germany in the form of equipment, supplies, training and operational costs to OICMA and the countries concerned (Nigeria, Cameroon and Chad).

Mandate of the DLCC

53. A number of delegates drew attention to the fact that the mandate of the DLCC is limited to the Desert Locust, and it was recommended that the FAO Secretariat study as a matter of urgency the possible extension of the mandate of the DLCC to other migratory pests and that the Secretariat submit appropriate suggestions/proposals to the next session of the DLCC.

DATE AND PLACE OF NEXT SESSION

54. The Committee recommended that the Director-General of FAO convene the next session of the DLCC in October 1981 at FAO Headquarters, Rome.

APPENDIX I

THE DESERT LOCUST SITUATION SUMMARY MAY 1979 - OCTOBER 1980
AND FORECAST TO 31 DECEMBER 1980

THE DESERT LOCUST SITUATION, MAY 1979 - OCTOBER 1980The Main Features

1. The period was characterized by a marked decline in numbers as compared with 1978. The last remaining gregarious populations which developed during the upsurge of 1977-78 were controlled in March 1978 in Eastern Ethiopia. There was widespread heavy rainfall in coastal areas around the Red Sea in late October 1979 which gave rise to very favourable breeding conditions. Control measures commenced in Sudan in January 1980 and extended to Egypt and Saudi Arabia in April and May. Hopper bands and swarms formed on the western side of the Red Sea but the infestations were completely cleared by June. In West Africa widespread rainfall in north-western Mali, northern Niger and southern Algeria resulted in a very rapid increase in numbers and to the formation of some hopper bands and swarms in September - October. Control operations commenced in July but further swarms would be produced.

South-West Asia

2. No gregarious populations were reported from South-West Asia after December 1978.
3. In India isolated adults were reported from Jaisalmer, Barmer, Bikaner, Jodhpur, Jalore, Nagaur and Sri Ganganagar districts of Rajasthan from May to December 1979; the maximum density being 2 100 per square kilometre at Dhana (2642N/7012E) in Jaisalmer district on 21 September. A small number of solitaricolor hoppers of different instars were found in Bikaner, Barmer and Jaisalmer districts between July and October, the densest population being near Sam (2650N/7031E) in late August when hoppers of all instars and fledglings were present at a density of 10 000 - 20 000 per square kilometre. No locust activity was reported during January, February and April 1980 and isolated adults at a maximum density of 75 per square kilometre were reported from one locality of Bikaner district in March and two localities of Jaisalmer district in May. Only one adult was reported in June but in July small numbers of scattered adults were found in several localities in Bikaner, Jaisalmer and Jodhpur districts of Rajasthan and one locality in Banaskantha district of Gujarat. The early monsoon rains were good over western Rajasthan and produced very suitable breeding conditions. Due to very limited immigration, breeding was on a very restricted scale, and by mid-October adult densities had declined to a maximum of 75 per square kilometre.

4. In Pakistan scattered adults in small numbers were reported from Thana Bulo Khan in Dadu district, Lasbela and Khuzdar and some first to third instar solitary hoppers were found in cultivations in Chagai district of Baluchistan in May 1979. During June there was evidence of an eastward migration. Numbers of adults appeared in the Cholistan, Khipro and Tharparkar deserts and declined in the west, while the highest numbers, up to 3 500 per square kilometre, were recorded in the Bhag district. During the second half of July and early August there was widespread rainfall in the summer breeding areas but no breeding was recorded and maximum densities of adults declined from 3 375 per kilometre in the first half of July to 1 350 in August, 750 in September, 600 in October, while only three adults were seen in November and none in December 1979.
5. In 1980 only one adult was found in Khuzdar in January and none were found in February. Two adults were discovered at Rumra in the coastal belt of Pasni on 8 March and in the second half of March immature and mature solitarious adults at densities ranging from 75 to 1 200 per square kilometre were reported from Lasbela and the Mekran. In April scattered adults were found in Mekran, Kalat and Quetta, the maximum density being 3 000 per square kilometre at Shooli (2536N/6206E) in the Mekran. Third to fifth instar solitary hoppers at 1 to 2 per bush were found over an area of 50 square kilometres in the Suntsar area against which preventive control measures were undertaken (these are summarized in Working Paper AGP:LCC/80/6).
6. Adults continued to be present at low densities in the spring breeding areas until mid-June and at the same time adults at low densities were reported from a number of localities in the Cholistan desert. During July small numbers of adults were observed in the Cholistan and Tharparkar deserts. In late July there was widespread and heavy rain in many parts of the summer breeding area but owing to the very small immigrant adult population very limited breeding occurred. In August and September adults at low densities were reported from numerous localities in the Tharparkar, Nara and Cholistan deserts, but by October no adults were found.
7. In Iran in May and June scattered adults were found in some green areas in Jiroft. Control measures were mounted over an area of 180 hectares, and against low density breeding in the same area. Some scattered solitary adults were reported from Iran in August, two from the Saravan area of Baluchistan province in September and a few from green areas of Jiroft in November and December. In 1980 a few solitary adults were reported from two localities with green vegetation in the Chababar area of south-eastern Iran in February. Small numbers of adults were collected from the Dalgan (2735N/5919E) area of Iranshahr in May and a further adult was reported from the same area in August. In September fourth and fifth instar hoppers and adults at densities of 1 000 per hectare were seen 25 kilometres north of Zabol (3100N/6132E) over an area of 4 - 5 square kilometres. Some damage was reported. During control operations 7 935 kg of BHC bran bait and 163 litres of 40% Aldrin E.C. were applied, and the infestation was completely controlled by 25 September.
8. No locusts were reported from Afghanistan.

Near East

9. In the Kingdom of Saudi Arabia some scattered adults persisted in the Tihama following the end of the winter-spring campaign which ended in March 1979. In addition isolated adults were found at a number of localities in the Hijaz and Asir mountains and in the interior up to September. During October a ground survey located isolated adults at a number of localities on the Qunfidah Tihama and on the Jizan Tihama. Small numbers of adults were also reported during November and up to late December 1979 from the Qunfidah and Jizan Tihama and from the Najran area.
10. In late December and early January there was widespread rain on the Tihama and in the interior and a ground survey team located adults at densities of 170 - 300 per hectare over an area of 100 square kilometres north-east of Qunfidah. There was further widespread rainfall later in January and in February and ecological conditions became very favourable for breeding. Low density hoppers and adults were recorded in the Qunfidah Tihama and small numbers of adults were seen on the Jizan Tihama, in Najran and at Yenbo. During March adults at densities of up to 100 per hectare were recorded over 200 square kilometres on the Jizan Tihama and at densities of 150 per hectare over 150 square kilometres on the Qunfidah Tihama and a few late instar hoppers were found in both areas. Low density adults were also reported around Lith. In April adult numbers declined on the Jizan and Qunfidah Tihamas but low density adults were recorded from Tuwwal, north of Jeddah, Abba, Baha, Najran and Dawadmi.
11. In early May a ground survey team located hoppers of all instars at densities of 3 - 5 per square metre over an area of 200 square kilometres in Wadi Azlam north of El Wejh on the northern Tihama. Fledglings were also present. Control measures were undertaken successfully and the area was clear by 15 May. Subsequently only isolated locusts have been reported, from Al Kharj, Bal Jureishi and Sajr. Heavy rain fell on the Tihama in late October.
12. In the Yemen Arab Republic only small numbers of adults were reported during the period, mostly from Wadi Hayran and Habl on the northern Tihama. Small numbers of fourth and fifth instar hoppers were found in Wadi Hayran between December 1979 and February 1980. Heavy rain fell on the Tihama on 4 October and again in late October 1980.
13. In the People's Democratic Republic of Yemen only small numbers of adults were found at various localities on the coast and in interior wadis between May and October 1979, including Wadi Al Fajra (1258N/4415E) in late May, between Ayn and Surra in the Dathina valley (1350N/4555E) in June, Wadi Surra in July, Wadi Habban (1425N/4715E) in September and Em Riga (1305N/4435E), Wadi Arma (1520N/4705E) and Wadi Masilah (1515N/5105E) in October. In November 20 adults were found in and around sorghum cultivations in Wadi Masadaiyah (1245N/4415E) over an area of about 10 square kilometres, including one mature female. In December a total of 10 adults were seen at four localities on the coastal and sub-coastal plains east and west of Aden.
14. During 1980 only low density adults were reported between January and May. They were mainly encountered on the coastal and sub-coastal plains east and west of Aden. Scattered showers fell over western areas in January - March while in April heavy rain was reported around Beihan on 2 April, and in the Markhah (1445N/4625E) and Khawrah (1428N/4609E) on 16 and 17. Widespread rain was reported from the Beihan and Lodar areas on 20 April. Further rains were reported and some Wadis were in flood during May but no locusts were observed. On 17 June an immature swarmlet, size unknown, was reported flying

north-east from the Al-Hadd area close to the border with the Yemen Arab Republic. Subsequently, small numbers of adults were reported from Em Riga in July and Wadi Nisab in August, but the country was clear in September.

15. In Egypt a few solitarious adults were seen in the south-eastern desert in August. In late October there was widespread and very heavy rain which created very favourable breeding conditions. Further scattered locusts were seen in November and December 1979, and many solitary adults were observed in January 1980 when the conditions were still favourable for breeding. In March and the first half of April scattered copulating adults and hoppers of all instars were reported close to the Sudan border. Control operations against hopper groups of moderate density and immature adults undertaken in this area over 16 square kilometres commenced on 24 April and continued until 19 May. Three immature swarms measuring 10 to 16 square kilometres entered the same area from Sudan between 2 and 10 May and were controlled. During June further control operations were undertaken against remaining adults and by July only a few isolated adults were reported. In September, however, solitarious adults and third and fourth instar hoppers were reported in newly cultivated areas in the Toshka sector (3228N/3132E) in Upper Egypt.

16. No locusts were reported from any other countries in the Near East Region.

Eastern Africa

17. In Sudan apart from a report of scattered adults in White and Blue Nile provinces in early May, there were no further reports until immature adults were reported at a density of 300 per hectare over an area of 1 000 square kilometres around Hamashkoreib (1711N/3644E) near the Ethiopian border on 15 July. Also in July mature adults were found at densities of 120 - 600 per hectare over an area of approximately 1 260 hectares around Sinkat in Red Sea Province. Rainfall was generally deficient in most of the summer breeding area except around Derudeb, Sinkat and Wadi Oko and no breeding on summer rains was reported.

18. In late October there was abnormally heavy and widespread rain along the Red Sea coast, Port Sudan receiving 76 mm compared with its mean monthly total of 6 mm. A ground survey, revealed mature, copulating adults at densities of 2 640 - 4 100 per hectare at five localities in the Tokar delta totalling 1 470 hectares and at two localities between Tokar and Port Sudan at densities of 180 per hectare over an area of 4 000 hectares. In November adults at densities of 180 - 1 260 per hectare were recorded from nine blocks of the Tokar delta over an area of 953 hectares and isolated second and third instar hoppers were present over an area of 76 hectares. In the central sector low density adults were found in four wadis over a total area of 970 hectares. During December scattered adults were recorded from several localities from the Tokar delta and the northern and southern sectors and conditions were fair for breeding.

19. In January 1980 a ground survey of the northern Red Sea coast and sub-coastal wadis revealed dense groups of fledglings in Wadi Oko at a density of 3 840 per hectare over an area of 800 hectares, dense groups of adults at a density of 5 580 per hectare over an area of 1 400 hectares at Ayoup Nonit (2045N/3558E), and scattered adults at densities of 240 - 300 per hectare over an area of 950 hectares between Abu Ramad (2221N/3629E) and Shalatein (2308N/3528E). In addition groups of third and fourth instar black and yellow hoppers were found over a total area of 1 250 hectares in Wadi Oko and at Ayoup Nonit, at

densities of 3 - 9 groups per hectare. In the central sector adults were present in three wadis at 130 - 240 per hectare over a total area of 1 200 hectares. In the Tokar delta a total area of 1 700 hectares was infested by adults at densities of 300 - 420 per hectare and in the southern sector adults were found at Khor Balatat at a density of 450 per hectare. Control was in progress in all areas using poisoned bait.

20. In February further hopper infestations were found in the northern sector. In Khor Soreit (2013N/3553E) small bands of first instar hoppers were seen on 22 February over an area of 140 hectares and controlled, and groups of second and third instar hoppers were found over an area of 360 hectares in Khor Garamait (2020N/3547E) on 16 February. In addition groups of mature adults were found in a number of Khors in the same area between 12 and 17 February over a total area of 1 900 hectares at densities ranging from 1 280 to 6 780 per hectare. Copulating pairs were observed and egg-pods were found. In March adults at low densities were again recorded in the Tokar delta and in Khor Balatat.

21. In late April there were four reports of immature swarms from the Wadi Di-ib area (2140N/3609E) some 150 kilometres north of the infestations reported in February, the largest swarm being 12 square kilometres in extent. In the same areas fourth and fifth instar hoppers and fledglings were reported over a total area of 2 600 hectares and immature adults at a density of 960 per hectare over an area of 120 hectares. Scattered mature adults were also recorded from a total area of 1 170 hectares in the Tokar delta and small numbers of adults were reported from Hamashkoreib. Control operations recommenced and continued during May and June. In May there was a further report of adults from Hamashkoreib, and others from Odi (1707N/3637E) in Kassala Province, from Hassaniyah (1618N/3150E) and Wadi El Humar (1652N/3321E) in Nile Province and from Jebel Shuweih (1384N/3148E) in Ed Dueim district of Nile Province. By July there were no further reports from the northern Red Sea sector and only reports of adults from two localities in the interior, in the Jebel Shuweih and Hashabat El Maganin (1346N/3127E) areas of Ed Dueim, at densities of 120 - 180 per hectare. In spite of moderate or good summer rainfall in June and July only isolated hoppers were reported from between Jebel Arashkul (1405N/3215E) and Hashabat El Maganin in August. There were also a few scattered adults in the Northern Kordifan Province in August. In late September a few adults were seen in Khor Adarkwar (2141N/3611E) to the west of the coastal range in the northern sector of the Red Sea coast.

22. In Ethiopia there was an unconfirmed report of a thin density population of mature adults from the Red Sea coast between Assab and Raheita on 20 June 1979 and a few scattered adults were reported from the Awash valley in September. In March 1980 reports were received from local inhabitants of notable infestations of mature adults and late instar hoppers in the Red Sea coastal area near the Sudan border. An unconfirmed report of a swarm on 25 March was received from Erer and Urso in the Railway Area. A ground team surveyed the area but could find no trace of locusts. A single immature adult was captured at Asmara on 20 June.

23. In Somalia some solitarious adults at low density were reported from northern coastal plains during May 1979 and two adults were seen on 6 December between Berbera and Hagal in the course of a ground survey of the coastal and sub-coastal plains between Loyada and Las Dureh from 27 November to 7 December 1979. Heavy rain was reported along the northern coast of Somalia in October 1980.

24. No locusts were reported from other countries within the Region.

West Africa

25. Rainfall was generally deficient during the summer of 1979 and only isolated adults were recorded during June and July. In August one male was captured at Aioun el Atrouss in Mauritania and in September mature adults were found copulating and laying at low densities in Aouker where good rains created favourable breeding conditions between 18° and 19° N and 13° and 14° W. During ground surveys undertaken from 9 - 29 October considerable numbers of first to fifth instar hoppers and adults were recorded at numerous localities in Aouker and in November first to fourth instar hoppers, fledglings and mature adults were found in green areas in Aftout de Faye (1835N/1355W) and in southern Tagant (1804N/1303W). In December low density adults and isolated hoppers were present in the Aftout area. In the first half of 1980 isolated adults were reported in May. The summer rains were generally deficient, though moderate rainfall was reported from north-west Tagant in August and in a number of localities in early September. Only isolated adults, however, were reported, from Aouker in August and Aioun El Atrouss in September.
26. In Mali moderate rain fell in the Adrar des Iforas, Timetrine and Tilemsi during the second decade of July 1979 and a number of wadis were in flood. Small numbers of adults were seen at five localities in the Adrar; some females were maturing. In August only a few mature females were observed. In September first to fourth instar hoppers were found at a density of 50 - 100 per hectare over an area of 3 hectares in Oued Tozraf (2005N/0150E) and scattered mature adults were observed in Oued Azou (1707N/0405E) and at Tidjelalen (1738N/0220E). Following moderate rain on 30 September ecological conditions were favourable for breeding in the south-west and south-east of the Adrar in October, when copulating and laying adults were present at densities of 50 - 100 per hectare over an area of 10 hectares at Taraghact (1848N/0039E). Mature and immature adults were also present at four other localities in the Adrar. In December isolated adults were recorded in Oued Ibdekan (1843N/0124E) in the Adrar.
27. In 1980, the Intertropical Front reached 19° N in the first decade of June and gave rise to moderate to heavy rain and flooding in the southern and south-eastern Adrar des Iforas. Kidal received 43 mm on 5 June. There were again good rains in July and further flooding of wadis. In June maturing and mature adults were observed at eight stations totalling 400 hectares in the south and south-east of the Adrar des Iforas at densities of 25 - 400 per hectare, and laying was observed. In July an intensive survey revealed hoppers and fledglings at densities of 1 - 5 per square metre, of which there were 5 000 - 30 000 fledglings per hectare in the Kidal-Tin Essako-In Tillit (1826N/0224E)-In Amadjel (1830N/0230E) areas. A total of 510 hectares was treated with 255 litres of 5% dieldrin. In August these populations had declined to 10 - 400 per hectare but further copulation was observed. In addition, at the confluence of Wadi Edjerar and the Tilemsi (1785N/0032E), control operations were undertaken against a mixture of desert locusts, Oedaleus and Aiolopus, at a density of 1 - 3 per square metre over an area of 200 hectares, using 100 litres of 5% dieldrin.
28. In September there were further good rains in western and south-east Adrar des Iforas. Aquelhok reported 47 mm and Tin Essako 35 mm. Groups of third to fifth instar solitari- and transiti-color hoppers were found at densities of 10 - 50 per square metre over areas of 500 - 1 000 hectares in the south-eastern Adrar des Iforas and in south-

west Timetrine. In addition immature, mature and laying adults were observed in patches of 5 - 30 hectares over a total area of 7 000 hectares at densities of 5 - 200 per square metre. Low density adults were seen flying by day in eastern Timetrine (1933N/0002E) on 23 September. A further 300 hectares were treated at the confluence of the Tilemsi and Wadi Edjerar with 190 litres of 5 % dieldrin. In October transiti- and gregari-color hoppers of all stages at densities of 5 - 10 per square metre and young adults at densities of 1 - 2 per square metre were being controlled in central Tamesna and western Adrar. Two diffuse immature swarms taking one hour to pass were seen flying SSE at In Oumfassen (1860N/0235E) on 25 October and at Tin Essako (1827N/0229E) on 26 October. In addition young adults were found at densities of 30 000 - 100 000 per hectare over an area of 10 000 hectares in oueds in the Bouressa basin. A total of 4 535 hectares were treated by exhaust nozzle sprayers and it was estimated that a further 10 000 hectares remained to be treated.

29. In Niger small numbers of second instar hoppers were seen at Eralral (1830N/0735E) at densities of 2 - 4 per plant in August 1979. In September only one adult was observed and in October some isolated adults and some solitaricolor first to fourth instar hoppers were found in northern Air. No locusts were reported in early 1980. In May there was significant rain in northern Air and Tamesna. In June very low density adults (less than one per hectare) and some solitaricolor second instar hoppers were seen on a survey of Tamesna and Air. There was further abundant rain north of 17° N in July and widespread rain in the first half of August and again in September. As a result conditions became very favourable for breeding. Small numbers of adults were found in August at two localities in Air at densities of 1 - 60 per hectare over a total of 360 hectares and at two localities east of Zinder.

30. In September, however, it became clear that there must have been a substantial invasion, probably from north-east Mali, in August, for it was found that almost all valleys to the north of In Abangarhil bounded by the coordinates 1805N-1917N and 0505E-0703E were infested by hoppers at densities of 25 - 50 per square metre and immature, mature, copulating and laying adults at densities of 5 - 10 per square metre. By 18 October adult densities had reached 750 000 per hectare. Aerial and ground control teams had treated 77 740 hectares by the end of October but it was estimated that a further 20 000 hectares required controlling.

31. No locusts were reported from Chad.

North West Africa

32. In Algeria there was widespread heavy rain between the Ahaggar massif and the Adrar des Iforas in May 1979, Tamanrasset recording 76 mm, compared with the monthly mean of 35 mm. Numerous adults were captured and several solitaricolor hoppers were observed in the south of the country in July and August. There was further widespread heavy rain in central and eastern Algeria on 23 - 24 September and immature adults were seen in several localities in southern Algeria in October. In 1980 small numbers of adults were seen in several localities in southern and western Algeria between January and April but no breeding was reported.

33. In July there was widespread heavy rainfall in the Timiaouine, Sibt and Tassili du Hoggar regions of southern Algeria. This was followed by further rain in the same areas in August and September and resulted in the development of very favourable breeding conditions. From 18 to 26 September immature and maturing adults were found at densities of up to 200 per hectare at 13 localities in the northern and north-eastern Adrar des Iforas and Tamesna. Subsequently it became evident that these represented the first arrivals of a substantial invasion, for in early October adults were found at densities of 40 000 - 70 000 per hectare at several localities in Tamesna. On arrival the adults matured rapidly and laid for, by 8 October, there were first instar hopper bands present. Ground control operations using exhaust nozzle sprayers to apply malathion commenced on 7 October and by 28 October 6 720 hectares of hoppers and adults had been treated. Good results were obtained against hoppers but results against adults were variable. Swarm formation was observed in Oued Chel Beganou (1907N/0343E) on 24 October. There were even reports of scattered adults from the Ahnel and Mouydir areas in the second half of October, indicating that some adults had moved considerably further north.

34. In Libya low density adults were observed in the Sarir Agricultural Project from 14 to 18 July 1979 and a further three adults were seen there amongst groups of Locusta over an area of 80 hectares between 19 and 25 November. No desert locusts were seen in 1980.

35. In Morocco small numbers of adults were seen at El Begaa (3056N/0352W) in July 1979 and again in June 1980. Four solitarious adults were captured at Er Rachidia (3156N/0425W) in October 1980.

36. No locusts were reported from Tunisia.

FORECAST TO 31 DECEMBER 1980

37. The most important populations are in north-west Niger, north-east Mali and southern Algeria, where hopper bands and swarms have already formed. Unless survey and control teams are able to locate and destroy all remaining major infestations, further swarms will be produced. Most are likely to move north and north-west and could reach southern Morocco and areas in Algeria south of 30° N. Some could subsequently move to Mauritania and others to western Libya and even Egypt. Some populations could remain in the southern Sahara where further breeding is possible in areas where ecological conditions remain favourable. In most other areas only small numbers of adults are likely to reach winter breeding areas.

38. In West Africa breeding will continue in the Adrar des Iforas, Tamesna, Tilemsi and Timetrine areas of north-east Mali, and in Tamesna of Niger. Further hopper bands and some swarms may be produced unless all significant populations are located and controlled. There is likely to be further emigration northwards but considerable numbers of adults may remain to overwinter within, or close to, the breeding areas. Small numbers of adults will occur and breed in Mauritania but it is possible that larger numbers of adults, possibly including swarms, could arrive from the north-east. These could result in breeding on a more extensive scale.

39. In North-West Africa further hatching is likely to occur in southern Algeria and to result in the formation of further hopper bands. Immigration by considerable numbers of adults, possibly including some swarms, is likely to continue during November. If swarms are present they could reach southern Morocco and areas in Algeria to the south of about 30° N. It is possible that some swarms could subsequently move south-west to northern Mauritania or they could move north-east to western Libya or possibly, as in November 1954, to other parts of Libya and even to Egypt.
40. In Eastern Africa adults produced in the interior of Sudan and adjacent areas of Ethiopia will move to the Red Sea coasts of both countries. They may be in sufficient numbers to form groups, particularly in areas which received summer floods, such as the Tokar delta. Breeding will start but initially it will be mainly at low densities. Some adults may reach the Danakil depression of eastern Ethiopia and others the northern coastal plains of Somalia. Low density breeding is likely to start along the northern Somali coast, following the heavy rain reported in October 1980.
41. In the Near East the numbers of adults will rise along the Tihamas of the Kingdom of Saudi Arabia and the Yemen Arab Republic and low density breeding will start in areas which have received summer floods or which receive early winter rain. Low density breeding may also occur in areas of the People's Democratic Republic of Yemen which received summer floods or which receive early winter rain. In eastern Arabia it is possible that small numbers of adults may reach the Sultanate of Oman and the United Arab Emirates.
42. In South-West Asia breeding will end in the summer breeding areas of Rajasthan in India and Cholistan, Rahimyar Khan, Nara, Khipro and Tharparkar deserts of Pakistan. Only small numbers of adults are likely to move west to the Makran of Pakistan and some may reach south-east Iran.

APPENDIX II

ANTI-LOCUST MEASURES UNDERTAKEN BY VARIOUS COUNTRIES
AND REGIONAL ORGANIZATIONS (MAY 1979 - OCTOBER 1980)

Locality	Month, Year	Types of Infestation	Infested Area (km ²)	Insecticide Used	Method of Application
<u>PAKISTAN</u>					
Suntsear	Apr. 80	Scattered hoppers & adults	50	25 litres 20% dieldrin	Ground
<u>IRAN</u>					
Jireft	June 80	Hoppers and adults	1.8	100 litres 20% dieldrin	Ground
Zabol	Sept. 80	Hoppers and adults	4-5	7 635 kg EHC bran bait 163 litres 40% aldrin EC	Ground Ground
<u>SAUDI ARABIA</u>					
Wadi Aslan	May 80	Groups of hoppers & fledglings	100	4 000 kg EHC dust	Ground
<u>EGYPT</u>					
South-eastern Desert	April - June 80	Hopper bands and swarms	68	25 622 kg EHC bran dust 930 kg EHC dust 20 845 kg cotton dust 420 kg DDT/lindane	Ground
<u>SUDAN</u>					
Red Sea Coast	Jan.- June 80	Hopper bands and swarms	103 960	kg EHC bran bait 950 kg EHC dust 404 litres 96% fenitrothion	Ground
<u>MALI</u>					
Adrar des Iforas Tillemsi Tamesna	July- Oct. 80	Hopper groups, fledglings & immature adults	145	4 650 litres 5% dieldrin	Ground
<u>NIGER</u>					
Tamesna	Sept.- Oct. 80	Hopper bands, immature & mature adults	21 600	9 150 litres 20% dieldrin 5 460 litres 5% dieldrin 5 050 litres 96% fenitrothion	Air & ground
<u>ALGERIA</u>					
Tamesna	Sept.- Oct. 80	Hopper bands, immature swarmlets, mature adults	1 500	4 280 litres 20% malathion	Ground

APPENDIX III

Desert Locust Emergency Assistance Provided under TCP

Item	Djibouti	India	Pakistan	Somalia	Sudan	Yemen A.R.	Yemen P.D.R.	Total
Fenitrothion 96%	2.5 t.	-	-	7 t.	20 t.	5 t.	4 t.	38.5 t.
Dieldrin 20%	2.5 t.	27 t.(teo.)	71 t.	30 t.	20 t.	20 t.	10 t.	180.5 t.
BHC 25% dust	40 t.	36 t.(teo.)	-	-	100 t.	100 t.	5 t.	281 t.
Motor knapsack sprayers	5	-	-	-	-	-	-	5
Hand dusters	50	-	-	-	-	100	-	150
Exhaust nozzle sprayers	3	-	-	20	20	25	10	78
ULV sprayers	-	-	-	-	-	100	-	100
Vehicles, light	2	-	-	5	-	7	3	17
Vehicles, heavy	1	-	-	-	-	-	-	1
Vehicle spare parts	-	-	-	\$4 500	\$15 000	\$38 500	\$2 500	\$60 500
Camping equipment	-	-	-	\$6 085	-	-	\$2 570	\$ 8 655
Radio sets	-	-	-	-	-	2	-	2
Scientific books, etc.	\$1 350	-	-	-	-	-	-	\$ 1 350

Desert Locust Emergency Assistance Provided under MCF

APPENDIX IV

Item	Djibouti	Ethiopia	Somalia	Sudan	Yemen A.R.	Total
Dieldrin	10 t.	10 t.	10 t.	10 t.	24 t.	64 t.
Vehicles, light	1	4	7	6	-	18

APPENDIX V

Desert Locust Emergency Assistance from International Donor Contributions

Item	Afghanistan	Algeria	Djibouti	Egypt	India	Iraq	Jordan
Fenitrothion ULV	-	-	-	-	*22 t.	-	-
Dieldrin 20% ULV	-	-	-	-	-	-	-
Lindane 1.5% dust	-	-	1 t.	-	-	-	-
BHC dust	-	-	-	-	-	-	-
Motor knapsack sprayers	-	-	-	-	-	-	-
Power dusters	-	-	-	-	-	-	-
Exhaust nozzle sprayers	-	-	-	-	-	-	2
Exhaust nozzle spare parts	-	-	-	-	-	-	-
Vehicles, light	-	-	-	-	-	-	-
Vehicles, heavy	-	-	-	-	-	-	-
Vehicle spare parts	-	-	-	-	-	-	-
Radio SSB 130 M	5	1	-	6	-	5	-
Radio SSB 1000 W	-	-	-	-	-	-	-
Radio spare parts	-	-	-	-	-	-	-
Camping equipment	-	-	-	-	-	-	-
Battery charger	-	-	-	-	-	-	-
Aircraft	-	-	-	-	-	-	-
Hire of helicopter	-	-	-	-	-	-	-
Aerial operations	-	-	-	-	-	-	-
Refuelling pumps	-	-	-	-	-	-	-
Operational cost	-	-	-	-	-	-	-
Honda generator	-	-	-	-	-	-	-
Mess kits	-	-	-	-	-	-	-
Camping bed linen	-	-	-	-	-	-	-
Rotary hand pumps	-	-	-	-	-	-	-
Radio VHF	-	3350	-	-	-	-	-
Crystals for SSB radio	-	-	-	-	-	-	-
Air conditioner for Peugeot	-	-	-	-	-	-	-
Working tools	-	-	-	-	-	-	-
Miscellaneous	-	-	-	-	-	-	-

*Buffer stock

APPENDIX V

Desert Locust Emergency Assistance from International Donor Contributions

Item	Morocco	Niger	Pakistan	Saudi Arabia	Somalia	Sudan	Syria
Penitrothion	*19 t.	24 t.	*22 t.	-	-	12.75 t.	-
Dieldrin 20% ULV	-	-	-	-	-	-	-
Lindane 1.5% dust	-	-	-	-	-	-	-
BHC dust	-	-	-	-	-	100.00 t.	-
Motor knapsack sprayers	-	65	-	-	-	-	-
Power dusters	-	4	-	-	-	-	-
Exhaust nozzle sprayers	-	-	-	-	-	-	-
Exhaust nozzle spare parts	-	-	-	-	-	\$750	-
Vehicles, light	-	-	-	-	-	-	-
Vehicles, heavy	-	4	-	-	-	-	-
Vehicles spare parts	-	-	-	-	-	-	-
Radio SSB 130 M	7	-	-	10	-	-	6
Radio SSB 1000 w.	-	-	-	-	\$3 133	-	-
Radio spare parts	-	-	-	-	-	\$950	-
Camping equipment	-	-	-	-	-	-	-
Battery charger	-	-	-	-	1	-	-
Aircraft	-	1	-	-	-	-	-
		\$120 000					
		Cessna 185					
Hire of helicopter	-	-	-	-	-	-	-
Aerial operations	-	-	-	-	-	-	-
Refueling pumps	-	-	-	-	-	-	-
Operational cost	4	\$23 800	-	-	-	4 \$30 000	-
Honda generator	-	-	-	-	-	-	-
Mess kits	-	-	-	-	-	-	-
Camping bed linen	-	-	-	-	-	-	-
Rotary hand pumps	-	-	-	-	-	-	-
Radio VHF	-	-	-	-	-	-	-
Crystals for SSB radio	-	-	-	-	-	-	-
Air conditioner for Peugeot	-	-	-	-	-	-	-
Working tools	-	\$4 000	-	-	-	-	-
Miscellaneous	-	\$18 861	-	-	-	\$2 500	-

*Buffer stock

APPENDIX V

Desert Locust Emergency Assistance from International Donor Contributions

Item	Tanzania	Tunisia	Uganda	United Arab Emirates	Yemen A.R.	Yemen P.D.R.	OCLALAV
Fenitrothion	-	-	-	-	-	-	-
Dieldrin 20% ULV	-	-	-	-	-	6 t.	-
Lindane 1.5% dust	-	-	-	-	-	25 t.	-
BHC dust	-	-	-	-	60 t.	-	-
Motor knapsack sprayer	-	-	-	-	-	6	-
Power dusters	-	-	-	-	-	-	20
Exhaust nozzle sprayers	-	-	-	-	-	-	-
Exhaust nozzle spare parts	-	-	-	-	-	8	-
Vehicles, light	-	-	-	-	1	1	2
Vehicles, heavy	-	-	-	-	\$1 820	\$3 500	\$32 000
Vehicle spare parts	-	-	-	-	5	6	8
Radio SSB 130 W	-	4	-	5	-	-	-
Radio SSB 1000 W.	1	-	-	-	\$1 650	\$2 625	-
Radio spare parts	-	-	-	-	20 sets	\$2 260	-
Camping equipment	5 sets	-	5 sets	-	-	-	-
Battery charger	-	-	-	-	-	-	-
Aircraft	-	-	-	-	-	-	\$82 848 Cessna
Hire of helicopter	-	-	-	-	-	-	-
Aerial operations	-	-	-	-	\$96 273	-	-
Refuelling pumps	-	-	-	-	-	-	-
Operational cost	-	-	-	-	-	-	-
Honda generator	-	-	-	-	-	1	\$14 286
Mess kits	-	-	-	-	-	10	-
Camping bed linen	-	-	-	-	-	\$300	-
Rotary hand pumps	-	-	-	-	-	4	-
Radio VHF	-	-	-	-	-	-	-
Crystals for SSB radio	-	-	-	-	\$350	-	-
Air conditioner for Peugeot	-	-	-	-	1	-	-
Working tools	-	-	-	-	-	-	-
Miscellaneous	-	-	-	-	-	-	-

APPENDIX V

Desert Locust Emergency Assistance from International Donor Contributions

Item	D L C O - E A							Total
	Djibouti	Ethiopia	Kenya	Somalia	Sudan	Tanzania	Uganda	General
Penitrothion	5 t.	20 t.	29.5 t.	20 t.	*25 t.	-	-	198.25 t.
Dieldrin 20% ULV	-	-	-	-	-	-	-	6 t.
Lindane 1.5% dust	-	-	-	-	-	-	-	1 t.
BHC dust	-	-	-	-	-	-	-	185 t.
Motor knapsack sprayers	-	-	-	-	-	-	-	65
Power dusters	-	-	-	-	-	-	-	10
Exhaust nozzle sprayers	-	-	-	-	-	-	-	22
Exhaust nozzle spare parts	-	-	-	-	-	-	-	\$750
Vehicles, light	1	3	-	8	8	-	-	34
Vehicles, heavy	1	11	3	13	12	-	-	48
Vehicles, spare parts	-	-	-	-	-	-	-	\$37 320
Radio SSB 130 M	2	5	6	6	7	-	-	94
Radio SSB 1000 w.	1	1	1	2	1	1	-	8
Radio spare parts	\$2 760	-	-	\$3 800	\$912	-	-	\$15 830
Camping equipment	5 sets	30 sets	10 sets	25 sets	20 sets	5 sets	5 sets	130 sets
Battery charger	-	-	-	-	-	-	-	\$2 260
Aircraft	-	-	-	-	-	-	-	1
								6
Hire of helicopter	-	-	-	-	-	-	-	1 Beech Baron
Aerial operations	-	-	-	-	-	-	-	3 DH Beavers
Refuelling pumps	-	-	-	-	-	-	-	\$381 091
Operational cost	-	-	-	-	-	-	-	\$75 000
Honda generator	-	-	-	-	-	-	-	\$246 273
Mess kits	-	-	-	-	-	-	-	8
Camping bed linen	-	-	-	-	-	-	-	\$68 086
Rotary hand pumps	-	-	-	-	-	-	-	1
Radio VHF	-	-	-	-	-	-	-	10
Crystals for SSB radio	-	-	-	-	-	-	-	\$300
Air conditioner for Peugeot	-	-	-	-	-	-	-	4
Working tools	-	-	-	-	-	-	-	8
Miscellaneous	-	-	-	-	-	-	-	\$700
	-	-	-	-	-	-	-	1
	-	-	-	-	-	-	-	\$4 000
	-	-	-	-	-	-	-	\$18 861

*Buffer stock

APPENDIX VI

Desert Locust Emergency Assistance Provided by UNDP/OPEC Special Fund

Item	Algeria	Egypt	India	Iraq	Jordan	Morocco	OCLALAV	Oman	Pakistan	Somalia	Sudan	Tunisia	Yemen A.R.	Total
Dieldrin	-	2 t.	-	2 t.	2 t.	-	-	-	-	-	8 t.	-	20 t.	34 t.
BHC dust	-	-	-	-	-	-	-	10 t.	-	-	-	-	-	10 t.
Exhaust nozzle sprayers	20	4	-	-	2	20	-	2	-	10	-	10	-	68
Vehicles, light	-	-	-	-	2	-	16	4	-	-	-	-	-	22
Vehicle spare parts	-	-	-	-	\$1 600	-	\$12 500	\$3 000	-	-	-	-	-	\$17 100
Radio sets	-	-	20	-	5	-	10	-	20	-	6	-	5	66

APPENDIX VIIREVIEW OF EXISTING CONTROL POTENTIAL AT THE NATIONAL AND REGIONAL LEVEL

In order to assess the available means for locust control in affected or threatened areas and evaluate future needs, FAO tries to keep an up-to-date record of control potential in various countries and organizations. Such a record is given in the attached table.

It should be noted that the information on application equipment and vehicles in several cases relates to both locust control and general plant protection, and that some of the vehicles are quite old and will soon be out of service. It should also be kept in mind that the position of the stocks of insecticides is changeable.

Country	Insecticides (tons)						Sprayers		Dust-ers	Vehicles		Aircraft			Staff				
	Total in billion lethal doses	Dieldrin 20% or equivalent	Permethrin 96% or equivalent	BHC liquid gamma 15%	BHC dust or equivalent 25%	BHC bait gamma 0.1%	Exhaust nozzle	Manual		Power	Light	Medium	Load Carrier	Fixed wing, Control		Helicopter control	Fixed wing, transport	Technical	General
Cameroon	1272.5	-	28.4	-	195	-	-	42	-	9	-	3	-	-	-	-	15	59	
Central African Rep.	800	-	20	-	-	-	-	-	-	-	-	-	-	-	-	-	6	43	
Mali	1294	0.75	21	25	420	-	6	-	110	40	99	6	5	6	-	-	-	-	
Mauritania	678	6.6	9.9	3	150	0.8	3	360	10	2	20	5	2	-	-	-	31	41	
Niger	3820	-	84	40	375	-	-	-	250	150	-	1	7	3	2	-	-	-	
Senegal	1802	30	14	-	615	-	10	314	450	600	205	10	15	2	-	-	-	-	
Upper Volta	396	-	5.9	-	200	-	11	-	100	-	-	2	-	-	-	-	-	-	
OCLALAV	4138	115	29.46	21.3	-	-	50	-	-	-	-	42	25	18	6	-	32	150	
Algeria	1632.6	-	40	-	3000	1996	30	1250	54	-	56	41	117	35	12	-	125	126	
Libya	2713	25	48	30	60	500	35	-	15	-	18	23	-	11	*	-	-	4	
Morocco	4566	4.6	78	-	1664	499	25	-	2	3	-	22	-	26	3	-	-	-	
Tunisia	920	-	15	-	400	-	13	116	67	275	80	4	2	1	6	-	-	6	
Djibouti	194	2.5	2.5	-	40	-	3	-	5	50	-	2	1	-	-	-	-	-	
Ethiopia	-	-	-	-	-	-	19	2656	2697	2690	-	12	-	1	-	-	-	-	
Kenya	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Somalia	-	-	-	-	-	-	20	-	-	-	-	5	-	-	-	-	-	-	
Sudan	1266	125	27	-	116	1632	20	500	300	-	50	33	-	40	4	2	-	-	
Tanzania	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Uganda	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
DICO-EA	7033	86	97.6	201.2	-	3.9	100	-	-	-	-	123	-	52	10	-	3	71	213
Bahrain	4	-	0.1	-	-	-	-	31	-	2	-	4**	-	-	-	-	-	16	
Egypt	195	3	2	5	16	300	5	-	30	40	8	30	30	8	-	-	80	300	
Iraq	115	-	2	-	40	100	40	120	50	-	-	46	-	4	4-10	-	20	50	
Israel	20	-	-	5	-	0.2	-	-	10*	-	-	10	-	1	*	-	-	-	

* Available if necessary

** Total for light and load carriers

APPENDIX VII (cont'd)

Country	Insecticides (tons)						Sprayers			Dust-ers		Vehicles			Aircraft			Staff	
	Total in billion lethal doses	Dieldrin 20% or equivalent	Permethrin 96% or equivalent	BHC liquid gamma 15%	BHC dust or equivalent 25%	BHC bait gamma 0.1%	Exhaust nozzle	Manual	Power	Manual	Power	Light	Medium	Load Carrier	Fixed wing, Control	Helicopter Control	Fixed wing, transport	Technical	General
Jordan	-	-	-	-	-	-	2	2	10	40	2	8**	-	-	-	-	-	50	
Kuwait	969	13	-	150	55	-	-	22	32	7	-	6	-	18	-	-	-	33	10
Lebanon																			
Oman	92	2.5	0.6	-	7	-	2	25	50	-	-	6	-	4	-	1	-	12	160
Qatar	10	0.4	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	2
Saudi Arabia	2345	81	7	-	150	-	40	-	-	-	-	-	-	1	-	-	-	-	80
Syria	291	5	-	9.5	160	-	13	-	256	230	142	100	-	20	-	-	-	10	2
United Arab Emirates	138	5	0.3	-	1	-	15	-	10	-	204	-	-	-	8	-	-	-	15
Yemen, Arab Rep.	1012	28	6.4	-	70	-	35	-	133	136	-	18	15	-	2	-	-	4	3
Yemen, P.D.R.	832.6	23	4	9	88	-	22	-	-	49	9	15	-	2	-	-	-	5	26
Afghanistan	-	-	-	-	-	-	10	10	-	100	1	21	-	11	-	-	-	80	25
India	4031	119	14	-	620	-	18	-	-	4781	168	107	-	7	35	-	-	141	181
Iran	608	21.5	-	16	8	-	32	1800	800	15	-	66	-	20	35	-	-	42	50
Pakistan	14104	150.8	240.2	60.6	182.1	108.7	36	-	-	146	3	100	-	16	23	-	-	144	305

** Total for light and load carriers

APPENDIX VIIIDEVELOPMENT PROJECT ON REMOTE SENSING APPLICATIONS
FOR DESERT LOCUST SURVEY AND CONTROL (Phase I)

GCP/INT/349/USA

I. INTRODUCTION

The Twenty-Third Session of the DLCC held in Rome in May 1979 reviewed FAO's activities on the development of the use of remote sensing for improving Desert Locust Survey and Control. The Committee strongly recommended that the Remote Sensing Development Project, prepared by FAO as a follow-up to the successfully concluded pilot project in North-West Africa, be implemented as soon as possible in view of the urgent need for more detailed and spatially continuous information on ecological conditions for Desert Locust breeding.

In September 1979 an agreement was concluded between FAO and the Government of the United States through its Agency for International Development (USAID) to establish a Trust Fund with a financial contribution from USAID to cover the first nine months of activities of the Remote Sensing Development Project (Phase I) with components at FAO Headquarters, in the area of the member countries of the North-West African Desert Locust Control Commission and in India and Pakistan.

During Phase I the project has concentrated on establishing working relationships with appropriate national and international organizations, the development and limited testing of practically-oriented remote sensing techniques for precipitation and vegetation development detection and monitoring, the establishment of remote sensing laboratories in Algeria and India and training of national plant protection staff in remote sensing data interpretation and utilization.

The activities and achieved results during Phase I are summarized in this paper whereas a detailed technical account is provided in the final technical report on Phase I.

II. STATUS OF PROJECT ACTIVITIES AND RESULTS ACHIEVED DURING PHASE I

1. Operational remote sensing data utilization at FAO Headquarters as an input to the Centralized Desert Locust Reporting and Forecasting Service

High frequency geostationary environmental satellite imagery coverage, acquired by Meteosat and GOES-Indian Ocean through the receiving facilities of the European Space Operations Center (ESOC) in Darmstadt and the Centre de Météorologie Spatiale in Lannion, France, was used during the autumn of 1979 for an assessment of the general ecological conditions in the Desert Locust recession area. The imagery, providing continuous coverage of the arid zone between the West African Coast and North-West India, proved to be a significant complement to the daily synoptic weather data, received at FAO, AGPP, through the Global Telecommunications Network Centres of the Italian and United Kingdom Meteorological Services.

The imagery, used by the WMO Synoptic Meteorologist Consultant in AGPP, enabled a detailed assessment of the spatial extent of reported rainfall events in the recession area and a significantly better interpretation of such events in terms of Desert Locust breeding conditions in national, regional and interregional contexts.

Furthermore, the imagery permitted detection of important rainfall events which were not recorded or reported by the sparse meteorological network in the Desert Locust recession area. Examples of rainfall events successfully detected and assessed through the Meteosat and GOES-Indian Ocean imagery were the tropical storm which affected the Oman coastal and interior areas on 18, 19 June 1979, the important rainfall events on both sides of the Red Sea in Egypt, Sudan and Saudi Arabia in the week from 17-21 October 1979, heavy rainfall in South-West Iran on 25, 26 October, in Northern Somalia on 15, 16 October, in Southern Somalia on 5 November and unusual rains in Algeria and Libya in October 1979.

A retrospective study of available DMSF weather satellite imagery for the period of 1-10 June 1978 revealed the main cause of the long range invasion of India and Pakistan by desert locusts which was first reported from India on 8 June in Gujarat. A persistent and very active cyclone, moving across the Arabian Sea from the Indian Coast towards Oman between 1 and 9 June 1978, created a strong west-south-westerly windfield across the Arabian Sea between East Africa and South-West Asia. This windfield, which was kept in force by the slowly moving cyclone for at least five days, is very likely to have been the transporter of the locust populations, present in the Horn of Africa and the Arabian peninsula at the time, across the sea to India.

The information derived qualitatively from the satellite imagery, combined with the synoptic weather data and the locust field reports permitted a more balanced preparation of the monthly Desert Locust Situation Summary and Forecast reports, issued by the FAO Desert Locust reporting and forecasting service in AGPP.

Unfortunately this activity had to be terminated in late November 1979 due to a failure of the imagery system on Meteosat and simultaneous departure of the GOES-Indian Ocean satellite, which disrupted the imagery coverage for the entire recession area. Coverage will be partly restored for this convenient type of satellite data with the launch of Meteosat-II, scheduled for October 1980, which will provide coverage for Africa and the Near East. Coverage for South-West Asia may for future activities be obtained through the polar orbiting satellites of the NOAA series, for which a receiving station of the National Remote Sensing Agency (NRSA) has been providing operational services since late 1979.

2. Operational Remote Sensing Facility in Regional Desert Locust Office, Algiers, Algeria

To test the operational aspects of the use of various types of remote sensing data in Desert Locust Survey and Control, it was decided to establish under the project an operational remote sensing laboratory in FAO's Regional Desert Office for North-West Africa in Algiers.

In June and September 1979 two programme formulation missions were undertaken in Algiers, during which the activities of the laboratory during Phase I of the project were defined. The laboratory has been equipped with basic equipment and supplies for manual data processing/interpretation of Meteosat/TIROS-N/NOAA-6 environmental satellite imagery. The laboratory is managed by an Algerian Agricultural Engineer who received basic and applied remote sensing training under a one-year FAO fellowship and seconded to the Regional Commission Secretariat under the supervision of the FAO Regional Desert Locust Officer, by the "Institut National de la Protection des Végétaux" (INPV) in Algiers.

In addition to the physical establishment of the remote sensing laboratory, the programme objectives of this facility during Phase I of the project are as follows:

- organization of routine and reliable data flows of conventional meteorological observations from the National Meteorological Services of Algeria, Morocco, Tunisia and Libya and Meteosat/TIROS-N satellite imagery from the satellite receiving facilities in Darmstad, Federal Republic of Germany, and Lannion, France, to the Regional Office on a daily basis.
- testing of the precipitation estimation technique developed for FAO by a consultant, with the available conventional and satellite data, under operational conditions.
- establishment of an easily accessible data archiving system for meteorological data, environmental satellite data and earth resources satellite data.
- construction of a Desert Locust habitat map for the North-West African region on the basis of Landsat MSS band 5 imagery mosaics.
- development of routine procedures for Landsat data acquisition, processing and interpretation for assessment of vegetation conditions in key areas.
- establishment of communications procedures with Desert Locust Survey and Control teams in the project area, National Plant Protection Institutions and FAO Headquarters.
- collection of data for realistic cost/benefit analysis.

These programme elements have been initiated during Phase I with emphasis on the meteorological aspects and the Desert Locust habitat mapping activity.

During a consultant mission by Dr. E.C. Barrett (University of Bristol, U.K.) in April 1980, a methodology for large area rainfall monitoring, using meteorological station observations and Meteosat/NOAA imagery, was defined in its final operational version and will be tested extensively during Phase II of the project.

An important achievement was the establishment of the flow of daily synoptic weather data from the four countries of the region directly to the Regional Office through the telex facilities of the INPV in Algiers. Although still incomplete, the existence of the data flow mechanism, which was arranged through the "Office de Météorologie Nationale" in Oran and its office at the international airport Dar-El-Beida, in Algiers, is considered an essential step forward to the successful operation of the rainfall estimation methodology.

Due to the failure of Meteosat in November 1979 a switch had to be made to TIROS-N/NOAA-6 imagery, supplied free of charge by CMS in Lannion, France. This receiving station is not able however to provide imagery coverage for the region south 25°N, thus leaving the summer breeding areas uncovered.

The Desert Locust habitat mapping activity at a scale 1:1 000 000, for which a full set of + 200 Landsat band 5 images was reproduced from the files of the FAO Remote Sensing Centre, is in progress. The final result of this activity will be a set of maps showing a small scale stratification of the North-West African Desert Locust Commission region in terms of potential Desert Locust occupation, based on a combination of desert surface material characteristics, topography and drainage patterns. These maps are intended to be used as a basis for future survey activities as well as a medium for compilation of multitemporal observations on rainfall and vegetation and for plotting locust data from the field.

3. Development of manual and digital image processing techniques for detection, quantification and monitoring of vegetation biomass development from multitemporal Landsat and TIROS-N/NOAA-6 digital data

For this Phase I project component, which is based at FAO Headquarters, a series of Landsat MSS and TIROS-N/NOAA-6 multitemporal data for test sites in Algeria, northern Mali and Morocco was acquired through the Italian and French receiving stations of Telespazio and CMS and the European Space Agency/Earthnet data distribution programme in Frascati, Italy.

The objective of this activity was to develop a series of satellite data processing techniques for extraction of information on post rainfall vegetation biomass relevant for Desert Locust population development with special emphasis on digital processing techniques which allow for a more detailed, quantitative and multitemporally consistent approach to the generation of the required information than manual/visual analysis procedures.

The data processing/analysis activities which started in late November 1979, included the following elements:

- the study of the four dimensional Landsat MSS feature space for arid areas in time and space.
- the development of a temporal/spatial data normalization technique for elimination of the influence of atmospheric effects between acquisition dates in order to obtain multitemporally comparable inputs for a largely automated information extraction procedures. This development activity was supported by multitemporal principal components analysis.
- the vegetation biomass detection, quantification and monitoring by:
 - . ratioing techniques
 - . feature space analysis
 - . maximum likelihood rule
 - . vegetation indexing.
- an analysis of possible data reduction in order to improve the cost effectiveness of the use of digital satellite data processing techniques for monitoring vegetation conditions over large areas without loss of relevant information.
- the automatization of the data processing package.
- the analysis of various photographic techniques for processing and analysis of multitemporal satellite data for obtaining information on vegetation development.

- a preliminary analysis of TIROS-N/NOAA-6 low resolution multispectral data regarding its information content for low cost, large area vegetation monitoring.

The digital image analysis activities have resulted in the development of a data processing package, consisting at present of various separate software programmes which, using the information from Landsat band 5 and 7 (red and near infrared), deal subsequently with:

- normalization of multitemporal digital satellite data for elimination of atmospheric effects in order to provide multitemporally comparable data for the thematic data classifier;
- linear combination of the red/near infrared spectral bands resulting in near infrared ratio values;
red
- digital slicing of the ratio value interval in selected classes for:
 - (a) separation of three main environmental classes:
 - . abiotic environment
 - . biotic environment
 - . free surface water;
 - (b) subdivision of the ratio value interval for the biotic environment resulting in a selected number of desert vegetation biomass classes;
- definition of a digital grid at selected level of detail and calculation of the number of pixels for each defined biomass class in each grid cell;
- calculation of a potential breeding activity factor (PBAF) on the basis of the biomass classes for each grid cell.

This methodology was developed on the basis of Landsat MSS data of two test sites in south-eastern Algeria and northern Mali and subsequently semi-operationally tested on a Landsat data set for an area in eastern Morocco where important rainfall occurred during the autumn of 1979. In the final technical report on Phase I, the methodology and the results of its application are documented in detail. The elements of the data processing package can be combined in one software programme and installed on general purpose computing systems.

In view of the enormous Landsat data volume involved on the scale of the Desert Locust recession area, even when through the efficient use of weather satellite data this volume can be considerably reduced, special emphasis was put on the selection of those digital data processing techniques which require minimal processing time and human operator supervision.

From data reduction analysis tests it was concluded that even when using less than 3 % of the acquired Landsat data for a given area, a detailed picture of the distribution of post rainfall vegetation development can be obtained through application of a selective data sampling technique.

The tests so far carried out with this processing methodology have produced very good results. The techniques used can be applied over the entire Desert Locust recession area and, by the calculation of potential breeding activity factors through the satellite observed vegetation biomass densities, combined with the selective data sampling technique, the enormous data volume provided potentially by Landsat, i.e. 4.5 billion data points for the recession area every eighteen days, can be reduced into manageable information at an acceptable cost level.

A preliminary analysis was carried out on a set of TIROS-N/NOAA-6 digital data regarding the information content of band 1 and 2 of this weather satellite for vegetation monitoring. These bands are roughly equivalent to the Landsat bands 5 and 7 as far as spectral coverage is concerned. The main difference between the TIROS-N/NOAA satellites and the Landsat series are their spatial resolution and temporal coverage, i.e. ± 0.5 ha and 18 days for Landsat and ± 120 ha and 0.5 days for TIROS-N/NOAA. The difference in spatial resolution has obvious consequences for using the low resolution data for vegetation detection and monitoring in arid areas where the spectral signals of vegetation, if present, are both weak and mixed with background radiation.

The first results of the TIROS-N/NOAA-6 data analysis, using the same processing methodology as developed by Landsat, indicate that despite the low spatial resolution, the NOAA-6 band 2 ratio contains distinct information on vegetation activity at the meso-band 1 scale, allowing for a simple quantitative approach to the detection of potential Desert Locust breeding sites at the regional/national level, which can be followed by the more detailed monitoring procedure with Landsat.

In addition to providing information on large-scale vegetation development, the TIROS-N/NOAA satellite data can be used to detect and monitor significant soil moisture changes over large areas through the use of the thermal channels of the same sensor.

Through the use of digital TIROS-N/NOAA data for soil moisture and vegetation monitoring, which is planned to be further developed during Phase II of the project, a further reduction in the use of the relatively costly Landsat data can be made.

In addition to the digital data processing techniques, requiring special computer facilities, a range of photographic satellite data processing techniques have been evaluated on their potential for vegetation assessment through visual analysis/interpretation of the photographic data products, e.g. false colour composite imagery, diase film composites and band 5/7 ratio images. These data types, provided the photographic processes are carefully controlled, allow for a qualitative assessment of vegetation conditions. However, information on low-very low vegetation densities is difficult to obtain consistently through visual analysis procedures. Both digital and manual techniques are documented in detail in the technical report.

4. Project activities in India and Pakistan

Following a preparatory formulation mission to India and Pakistan in August 1979, two programme development missions were undertaken to both countries in January and May 1980 with the objective to prepare a programme of activities in the framework of the project in cooperation with the Plant Protection Departments of India and Pakistan and the National Remote Sensing Agencies NRSA in India and SUPARCO in Pakistan.

In India this has resulted in a programme including basic and advanced training in remote sensing for selected Desert Locust field staff at NRSA facilities in Dehra Dun and Secunderabad, construction of a Landsat false colour composite mosaic of the Indo-Pakistan Desert Locust breeding areas, establishment of a basic remote sensing laboratory at the field Headquarters of the Indian Locust Warning Organisation in Jodhpur, Rajasthan and an experimental programme for testing the use of Landsat and TIROS-N/NOAA-6, 7 data for monitoring ecological conditions for Desert Locust breeding and development in the Rajasthan desert. Two staff members of the Indian Locust Warning Organisation (LWO) completed a six-month training programme in basic and advanced photo-interpretation and remote sensing at NRSA facilities, sponsored by the project. Towards the end of the training programme a special training course was organised by the FAO Project Coordinator at NRSA in Secunderabad on the specific applications of remote sensing to Desert Locust survey and control work. Upon completion of their training these LWO staff members have returned to the field Headquarters of this organization to set up a basic remote sensing laboratory and to prepare a comprehensive field work programme for the planned remote sensing experimental work in Rajasthan during the 1980 monsoon season in the framework of the FAO project.

The activities of the project in India are actively supported by the National Remote Sensing Agency of the Indian Government, which operates a Landsat/TIROS-N satellite receiving station near Secunderabad covering entire south-west Asia for both environmental and earth resources data. This station was commissioned by the project to acquire and process a Landsat MSS false colour composite imagery set during the autumn of 1979 and to construct a colour mosaic of the imagery covering the entire Indo-Pakistan Desert Locust breeding area, including the agricultural areas of the Indus river basin. Furthermore the NRSA station has been contracted by the project to acquire regular Landsat and NOAA 6/7 coverage between January and October 1980 over selected test-sites in Rajasthan for the planned experimental work.

Firm contacts have been established through the activities of the FAO project between the Plant Protection Department in India and the National Remote Sensing Agency and various action points have already been defined for further strengthening this relationship in the medium and longer terms.

In Pakistan, a programme similar to that in India had been defined during the missions of August 1979 and January 1980. It was planned that two staff members of the Plant Protection Department in Karachi would receive basic remote sensing training at the facilities of the National Remote Sensing Agency in Pakistan (SUPARCO) during the spring of 1980 and subsequently would attend the special training course given by the Project Coordinator in Secunderabad, India, in May, after which a field programme would be prepared for the 1980 summer breeding season in eastern Pakistan. Due to various delays this programme had to be revised during the mission in May. At present the selected staff are undergoing the basic training at SUPARCO and the special one week training course is scheduled to be held in Karachi in late September after a field work period in India. Subsequently a field programme will be prepared for experimental activities during the next winter/spring breeding season in the Mekran/Baluchistan region of Pakistan.

III. PHASE I PROJECT OUTPUTS

Although most of the activities initiated by the project during Phase I will continue during the planned Phase II and the final operational outputs of these activities will only become available as such during Phase II, the following outputs of Phase I can be defined:

- active working relationships between FAO and a number of agencies for environmental and earth resources data acquisition, processing and analysis, e.g. the ESA/Earthnet Programme, Frascati/Italy; ESA/ESOC, Darmstadt/Germany; CMS, Lannion/France; IBM, Rome/Italy; NRSA, Secunderabad/India; SUPARCO, Karachi/Pakistan.
- a digital data processing package, enabling routine extraction of information of location, extent and quantity of vegetation development for either Landsat or TIROS-N/NOAA satellite data for any location in the Desert Locust Recession Area at various levels of required detail.
- an operational methodology for rainfall monitoring using conventional meteorological and environmental satellite data, enabling routine monitoring of precipitation over large arid areas at one square degree accuracy.
- a variety of manual satellite imagery processing techniques for use at the field level.
- an active remote sensing facility, equipped for manual data processing/analysis in the Regional Desert Locust Office in Algiers, presently handling various types of conventional and satellite data for extraction of information on ecological conditions for locust population development in the recession area of Morocco, Algeria, Tunisia and Libya on a semi-routine basis.

- an active programme of data acquisition, remote sensing training, infrastructure development and experimental work in India and Pakistan, prepared and executed jointly by FAO, the National Plant Protection Departments and the National Remote Sensing Agencies.
- a Phase II programme, structured and prepared on the basis of experience gained during Phase I.

IV. PROPOSAL FOR PHASE II OF THE PROJECT (1981/82)

Following discussions between USAID and FAO in Washington in April 1980 regarding the project, a proposal for a Phase II programme for two years was prepared and recently submitted to USAID. The programme objectives which are intended to be realized through various interlinked development and field components, involving close cooperation with the centralized Desert Locust reporting and forecasting service at FAO Headquarters, FAO Desert Locust Control Commissions in North-West Africa, the Near East and South-West Asia, regional organisations (DLCO-EA and OCLALAV), national plant protection institutions and national/international remote sensing agencies, are:

- to strengthen and expand the present capabilities at FAO Headquarters and the regional/national Desert Locust organisations and commissions for the acquisition, handling, analysis and interpretation of conventional and remote sensing data for improving Desert Locust surveying, reporting and forecasting at the various levels;
- to provide operational inputs to the centralized reporting and forecasting service at FAO;
- to improve the data links between FAO and the regional/national reporting and forecasting centres;
- to implement and field-test proven remote sensing techniques, developed during the pilot project and Phase I, in operational schemes;
- to develop and test new remote sensing techniques for precipitation, soil moisture and vegetation monitoring, as they become available with the launching of new environmental and earth resources satellites, e.g. Meteosat II and Landsat-D;
- training of national plant protection staff in remote sensing data utilization to increase the efficiency and effectiveness of Desert Locust survey and control operations;
- to examine the use of remote sensing techniques for improving the surveillance and forecasting of other migratory pests of international significance, e.g. Quelea quelea, African armyworm and the African Migratory Locust, Locusta migratoria migratorioides, with special emphasis on the latter in view of the present threat of a Locusta plague during the next few years.

The starting date for the Phase II programme is planned for 1 January 1981.

APPENDIX IXCO-ORDINATION WITH UNDP/FAO ACTION PROGRAMME FOR
IMPROVED PLANT PROTECTION

In January 1980 FAO launched its Action Programme for Improved Plant Protection, with an initiating grant from UNDP. The main objective of this Programme is to strengthen the structures and capabilities of the national plant protection services in various developing countries striving to increase their food product but lacking the proper means to safeguard this product from damage, if not substantial destruction, by pests.

The need for collaborative action between national governments, regional structures and donor and technical assistance agencies in the field of plant protection and particularly in the field of locust control, has long been recognized. The basic reasons for this are the international character of pest spread and attack and the relative unpredictability of pest outbreaks, which then call for well co-ordinated actions.

A number of international bodies and donor countries have been engaged in plant protection activities and projects attempting to solve specific problems and to develop appropriate technologies. However, these efforts have not always been properly coordinated, and although one can certainly say that many have been successful taken separately, on the whole the efforts were scattered and mostly of a temporary nature. Furthermore, insufficient consideration has been given to the necessity of improving the infrastructure and the capabilities of the national plant protection services without which any attempt to apply our knowledge and new findings in the field of pest control is condemned to failure.

The very considerable international efforts mobilized in order to eliminate the 1977-79 Desert Locust upsurge provided a clear demonstration of the possibilities for such well coordinated action when both donor and recipient countries and organization combined in large scale cooperative action: but it also drew attention to a lack of preparation in some instances which necessitated many ad hoc and costly emergency measures.

Therefore there is an urgent need to plan and develop a comprehensive and sustained effort to devise long term approaches on the part of the various international bodies, donor countries and the developing countries, and to set forth common aims and policies. At a donor meeting convened by the Director-General of FAO on 30 March 1979 to seek contributions for the Desert Locust upsurge, the need for a more permanent mechanism of

cooperation in plant protection in general was clearly identified, and support for its co-ordination through the FAO was expressed by various countries, and in particular by UNDP. The wish for co-ordination of such a concerted action under the auspices of FAO has also been expressed on a number of recent occasions by various international bodies. This led to the present Action Programme for Improved Plant Protection.

The Action Programme is run by an FAO Secretariat comprising a Programme Manager and supporting staff, and operating under the direct supervision of the Chief of the Plant Protection Service. A Plant Protection and Locust Control Officer, was appointed to serve in East/Southern Africa. The Secretariat works in close collaboration with a selected group of experts representing developing and donor countries operating within the framework of the FAO Committee of Experts on Pest Control. The first session of the Committee was held on 6 and 7 March 1980 in Rome to discuss the implementation of the Action Programme.

The first stage of the Programme will concern Africa and the Arabian Peninsula, mainly in the countries within the Desert Locust Recession Area. Many countries have been formally invited to participate in the Action Programme. Upon agreement of the governments concerned, a survey of plant protection problems will first be carried out in a number of countries. This may include visits by expert missions and Regional Locust Control and Plant Protection Officers.

These surveys and their evaluation will serve as a basis for proposals to be discussed with the governments, leading to the adoption of final action projects to be submitted to funding sources. With respect to the above, it should be stressed that the major donors have expressed their intention to plan and coordinate their bi- and multi-lateral assistance in the field of plant protection through the Action Programme.

Co-ordination between the Locust Group at FAO and the Action Programme will be very close and the Action Programme Secretariat will act as the channel through which donor support for strengthening anti-locust activities not covered by existing trust funds/bi-lateral assistance will be explored.

APPENDIX XTRAINING PROGRAMME

Training of Desert Locust Officers has been continued at all levels under the Regional and International Desert Locust Trust Funds and UNDP.

The Advisory Group envisaged by FAO and UNDP for the improvement of locust control services (mentioned in the Report of the 23rd Session of the DLCC) has not materialized and so far the overall evaluation of the needs of member countries has not taken place.

The tables below show FAO fellowships, training courses and exchange visits implemented in 1979-80.

I. Fellowships

Daraz, G.	Afghanistan	- Hyderabad, Jodhpur	- 7.9.79 - 4.11.79
Saber, M.	Afghanistan	- Hyderabad, Jodhpur	- 7.9.79 - 4.11.79
Wodood, A.	Afghanistan	- Hyderabad, Jodhpur	- 7.9.79 - 4.11.79
Wais, A.U.	Afghanistan	- University of Teheran	- 2.2.74
Boudegzdame, B.	Algeria	- University of Paris	- 23.10.77 - 12.5.79
Lounis, M.	Algeria	- U.K., Italy, France	- 17.9.78 - 14.7.79
Harb, M.A.F.	Egypt	- IARI, New Delhi	- 3.9.80 - Jan. 81
Ibrahim, S.I.	Egypt	- IARI, India	- 9.9.76 - 3.3.80
Chandra, S.	India	- University of Reading	- 19.9.76 - 30.11.79
Rassi-pour, A.	Iran	- University of Paris	- 24.9.76 - 30.6.79
Ben Halima, T.	Morocco	- University of Orsay	- 25.11.79 - Oct. 80
El-Chandi, S.A.W.	Saudi Arabia	- Plant Protection Dep., Sudan	- Sept. 80
Ahmed, A.G.M.	Sudan	- Univ. Pierre & Marie Curie	- 1.11.77
El Shahari, Y.	Yemen A.R.	- University of Riyadh	- 8.7.79
Bahakim, F.M.	Yemen P.D.R.	- University of Khartoum	- 15.11.79
Algeaidi, K.A.	Yemen P.D.R.	- Hyderabad, Jodhpur	- 31.1.80 - 31.5.80

II. Training Courses(a) Radio MaintenanceParticipants

Libya (Tripoli)	10 to 25 March 1979	10
Morocco (Agadir)	15 to 26 October 1979	10
Algeria (Algiers)	10 to 29 November 1979	15

Yemen, P.D.R. (Aden)	17 January to 13 February 1980	10
India (Jodhpur)	7 to 29 April 1980	16
Egypt (Cairo)	20 August to 14 September 1980	14
Pakistan (Karachi)	4 to 26 October 1980	14

(b) Locust Survey and Control

Algeria (Algiers)	22 to 27 March 1980
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(c) Remote Sensing

Italy (Rome)	16 to 26 October 1980
India (Secundarabad)	4 to 9 May 1980
Pakistan (Karachi)	4 to 9 October 1980

III. Exchange Visits

Mr. A. Refaat (Egypt)	to Pakistan and India	September 1980
Mr. I. Madani (Saudi Arabia)	to Pakistan and India	August/Sept. 80

APPENDIX XI

INTERNATIONAL DESERT LOCUST TRUST FUND 9161
 BUDGET AND STATEMENT OF ACCOUNT (Expressed in US \$ Equivalents)

	Approved Annual Budget	Expenditure 1979	Estimate 1980
<u>Receipts</u>			
Balance brought forward (Deficit)		(28 702)	(100 347)
Contributions from Member Governments	80 916	61 132	80 916
Transfer from TF 9577 (Emergency Donor Fund)			100 000
Interest		(6 965)	
	<u>80 916</u>	<u>25 465</u>	<u>80 569</u>
<u>Cash Expenditure</u>			
<u>Code</u>			
10 Personal Services	10 000	30 650	5 000
20 Travel on official business	15 000	20 475	10 000
30 Contractual Services	10 000	29 357	5 000
40 General Operating Expenses	-	6 809	1 000
50 Expendable Supplies	4 100	14 144	1 000
60 Equipment	25 000	313	-
80 Fellowships and Training	5 000	8 613	-
90 Project Service Costs (14%, 5% on Codes 50, 60)	9 674	15 451	3 080
Total Expenditure	<u>78 774</u>	<u>125 812</u>	<u>25 080</u>
Unallocated Balance/ (Deficit)	2 142	(100 347)	55 489
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The Director-General of FAO was empowered by the 14th Session of the DLCC, 1970, to change the allocation of sums allotted to different chapters in order to meet the changing needs of the locust situation, subject to the total annual expenditure not exceeding the total budget.

APPENDIX XII

SCALE OF GOVERNMENT CONTRIBUTIONS PLEDGED TO
THE INTERNATIONAL DESERT LOCUST TRUST FUND No. 9161

<u>Country</u>	<u>US\$</u>
Afghanistan	1 910
Algeria	2 580
Bahrain	720
Chad	1 800
Djibouti	420
Egypt	3 920
Ethiopia	2 180
Ghana	1 950
India	10 000
Iran	3 690
Iraq	2 480
Jordan	1 730
Kenya	1 800
Kuwait	420
Lebanon	1 350
Libya	1 820
Mali	1 800
Mauritania	1 720
Morocco	2 990
Niger	1 800
Nigeria	3 650
Oman	830
Pakistan	5 860
Qatar	830
Saudi Arabia	1 830
Senegal	2 010
Sierra Leone	358
Somalia	1 450
Sudan	2 250
Syria	2 010
Tunisia	1 990
Turkey	5 350
Uganda	1 650
United Arab Emirates	5 500
Yemen, Arab Republic	1 840
Yemen, People's Democratic Republic	120
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	84 608
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APPENDIX XIII

TRUST FUND No. 9161 - INTERNATIONAL DESERT LOCUST CONTROL COMMITTEE
(Pledged Position at 30 April 1980 (U.S. Dollars))

	Outstanding 1970/71 1971/72	Outstanding 1976/77	Outstanding 1977/78	Outstanding 1978/79	Outstanding 1979/80	Outstanding 1980/81	Total Outstanding Contribution Due
Afghanistan	-	-	-	-	-	1 910.00	1 910.00
Algeria	-	-	-	-	2 580.00	2 580.00	5 160.00
Bahrain	-	-	-	-	-	720.00	720.00
Chad	-	1 800.00	1 800.00	1 800.00	1 800.00	1 800.00	9 000.00
Egypt	-	-	-	-	-	3 920.00	3 920.00
Ethiopia	-	-	-	-	-	-	-
France (Djibouti)	-	-	-	420.00	420.00	420.00	1 260.00
Ghana	-	-	-	-	-	(2 944.06)	(2 944.06)
India	-	-	-	-	-	10 000.00	10 000.00
Iran	-	-	-	-	3 690.00	3 690.00	7 380.00
Iraq	-	-	-	-	-	-	-
Jordan	-	-	-	-	-	1 730.00	1 730.00
Kenya	-	-	-	-	-	1 800.00	1 800.00
Kuwait	-	-	-	-	-	420.00	420.00
Lebanon	-	-	-	1 350.00	1 350.00	1 350.00	4 050.00
Libya	-	-	-	-	-	-	-
Mali	-	-	-	-	-	-	-
Mauritania	-	1 305.09	1 720.00	-	1 597.75	1 800.00	3 397.75
Morocco	-	-	-	1 720.00	1 720.00	1 720.00	8 185.09
Niger	-	-	-	-	2 990.00	2 990.00	5 980.00
Nigeria	-	-	-	-	-	1 800.00	1 800.00
Oman	-	-	-	-	-	(2 700.00)	(2 700.00)
Pakistan	-	-	-	-	-	830.00	830.00
Qatar	-	-	-	830.00	830.00	5 860.00	5 860.00
Saudi Arabia	-	-	-	-	-	830.00	2 490.00
Senegal	-	-	-	-	-	1 830.00	1 830.00
Sierra Leone	-	-	157.27	1 788.33	2 010.00	2 010.00	5 808.33
Somali Republic	-	-	968.33	358.00	358.00	358.00	1 231.27
Sudan	-	-	2 250.00	1 450.00	1 450.00	1 450.00	5 318.33
Syrian Arab Republic	-	-	-	2 250.00	2 250.00	2 250.00	9 000.00
Tunisia	-	-	-	-	2 010.00	2 010.00	4 020.00
Turkey	-	-	-	-	-	(768.82)	(768.82)
Uganda	-	-	-	-	(230.24)	5 350.00	5 580.24
United Arab Emirates	-	-	-	-	1 650.00	1 650.00	3 300.00
Yemen, Arab Republic	-	-	-	-	-	5 500.00	5 500.00
Yemen, P.D.R. of	-	-	-	-	-	-	-
	240.00	120.00	120.00	120.00	120.00	120.00	840.00
	240.00	3 225.09	7 015.60	12 086.33	27 055.99	65 685.12	115 308.13

TWENTY-FOURTH SESSION OF THE DESERT LOCUST CONTROL COMMITTEE - Rome, 3 - 7 November 1980

Basic Data for Calculating Scale of Governmental Contribution to the International Trust Fund, TF 9161

Country	Locust Frequency 40 Years 1939-1978			Arable Land and Land under Permanent Crops		Exposure to Damage CxDxE	Relative Log Exposure (F) (%)		Relative Quota for Contrib. to UN 1978-79 (%)	H	I	Scale of Contributions to International Trust Fund TF 9161				
	Swarms	Hopper Bands	Mean	Total area '000 ha	% subject to serious damage		E	F				G	J	K	I adjusted to maximum for any one Country	
															10%	5%
A	B	C	D	E	F	G	H	I	J	K	L	M				
Afghanistan	13	11	12.0	8 050	30	28 980	2.36	0.32	1.34	1.38	2 760	1.56	3 120			
Algeria	23	19	21.0	7 845	100	164 745	2.76	3.17	2.96	3.04	6 080	3.45	6 900			
Bahrain	7	3	5.0	2	100	8	0.48	0.32	0.40	0.41	820	0.47	940			
Benin	3	0	1.5	575	50	431	1.40	0.32	0.86	0.88	1 760	1.00	2 000			
Cameroon	4	0	2.0	7 390	20	2 956	1.84	0.32	1.08	1.11	2 220	1.26	2 520			
Central African Republic	6	0	3.0	2 910	30	2 619	1.81	0.32	1.07	1.10	2 200	1.25	2 500			
Chad	21	12	16.5	1 950	100	32 175	2.39	0.32	1.35	1.39	2 780	1.57	3 140			
Djibouti	20	10	15.0	1	100	15	0.62	0.32	0.47	0.48	960	0.55	1 100			
Egypt	21	12	16.5	2 838	100	46 827	2.47	2.54	2.51	2.58	5 160	2.92	5 840			
Ethiopia	32	34	33.0	13 730	90	407 781	2.97	0.32	1.64	1.68	3 360	1.91	3 820			
Gambia	7	0	3.5	265	100	927	1.57	0.32	0.95	0.98	1 960	1.11	2 220			
Ghana	3	0	1.5	2 720	30	1 224	1.64	0.63	1.13	1.16	2 320	1.32	2 640			
Guinea	7	0	3.5	4 170	40	5 838	1.99	0.32	1.16	1.19	2 380	1.35	2 700			
India	29	27	28.0	168 500	20	943 600	3.16	21.58	12.37	10.00	20 000	5.00	10 000			
Iran	28	20	24.0	15 950	80	306 240	2.91	12.69	7.80	8.01	16 020	5.00	10 000			
Iraq	16	15	15.5	5 395	90	75 260	2.58	2.54	2.56	2.63	5 260	2.98	5 960			
Israel	14	12	13.0	413	100	5 369	1.97	7.30	4.63	4.76	9 520	5.00	10 000			
Ivory Coast	4	0	2.0	3 800	40	3 040	1.84	0.63	1.24	1.27	2 540	1.44	2 880			
Jordan	18	15	16.5	1 370	100	22 605	2.31	0.32	1.31	1.35	2 700	1.53	3 060			
Kenya	19	16	17.5	2 270	100	39 725	2.44	0.32	1.38	1.42	2 840	1.61	3 220			
Kuwait	17	16	16.5	1	100	16	0.64	4.76	2.70	2.77	5 540	3.14	6 280			
Lebanon	4	1	2.5	348	70	609	1.47	0.95	1.21	1.24	2 480	1.41	2 820			
Libya	18	12	15.0	2 564	100	38 460	2.43	5.08	3.76	3.86	7 720	4.38	8 760			
Mali	21	18	19.5	2 050	100	39 975	2.44	0.32	1.38	1.42	2 840	1.61	3 220			
Mauritania	25	20	22.5	195	100	4 387	1.93	0.32	1.12	1.15	2 300	1.30	2 600			

Country	A	B	C	D	E	F	G	H	I	J	K	L	M
Morocco	26	18	22.0	7 868	100	173 096	2.77	1.58	2.18	2.24	4 480	2.54	5 080
Nepal	2	0	1.0	2 319	10	232	1.25	0.32	0.78	0.80	1 600	0.91	1 820
Niger	24	20	22.0	3 112	100	68 464	2.56	0.32	1.44	1.48	2 960	1.68	3 360
Nigeria	14	3	8.5	23 990	60	122 349	2.69	4.12	3.41	3.50	7 000	3.97	7 940
Oman	24	15	19.5	36	50	351	1.35	0.32	0.83	0.85	1 700	0.97	1 940
Pakistan	33	31	32.0	19 990	90	575 712	3.05	2.22	2.64	2.71	5 420	3.07	6 140
Portugal	1	0	0.5	100	100	50	0.90	0.32	0.61	0.63	1 260	0.71	1 420
(Madeira)													
Qatar	7	3	5.0	2	100	10	0.53	0.63	0.58	0.60	1 200	0.67	1 340
Saudi Arabia	31	30	30.5	1 105	100	33 702	2.40	7.30	4.85	4.98	9 960	5.00	10 000
Senegal	16	9	12.5	2 404	100	30 050	2.37	0.32	1.34	1.38	2 760	1.56	3 120
Sierra Leone	4	0	2.0	566	50	566	1.46	0.32	0.89	0.91	1 820	1.04	2 080
Somalia	27	26	26.5	1 066	100	28 249	2.36	0.32	1.34	1.38	2 760	1.56	3 120
Spain	3	1	2.0	250	20	100	1.06	0.32	0.69	0.71	1 420	0.80	1 600
Sudan	31	32	31.5	7 515	60	142 033	2.73	0.32	1.53	1.57	3 140	1.78	3 560
Syria	12	10	11.0	5 588	100	61 468	2.54	0.63	1.58	1.62	3 240	1.84	3 680
Tanzania	11	8	9.5	5 140	80	39 064	2.43	0.32	1.38	1.42	2 840	1.61	3 220
Togo	1	0	0.5	1 420	50	355	1.35	0.32	0.83	0.85	1 700	0.97	1 940
Tunisia	13	11	12.0	4 415	100	52 980	2.50	0.63	1.57	1.61	3 220	1.83	3 660
Turkey	7	4	5.5	28 045	25	38 562	2.43	9.52	5.97	6.13	12 260	5.00	10 000
Uganda	11	4	7.5	5 610	50	21 037	2.29	0.32	1.31	1.35	2 700	1.53	3 060
United Arab Emirates	22	13	17.5	12	50	105	1.07	2.22	1.64	1.68	3 360	1.91	3 820
Upper Volta	6	0	3.0	5 633	100	16 899	2.24	0.32	1.28	1.31	2 620	1.49	2 980
Western Sahara	20	11	15.5	2	100	31	0.79	-	0.40	0.41	820	0.47	940
Yemen, Arab Rep.	26	20	23.0	1 570	100	36 110	2.41	0.32	1.36	1.40	2 800	1.58	3 160
Yemen, P.D.R.	29	26	27.5	265	100	7 287	2.05	0.32	1.19	1.22	2 440	1.39	2 780
TOTALS							100.00	100.00	100.00	100.00	200 000	100.00	200 000

APPENDIX XV

NINTH SESSION OF THE DESERT LOCUST CONTROL COMMITTEE - Rome, 29 June - 3 July 1964

Basic Data for Calculating Scale of Governmental Contributions for International Trust Fund

Country	Locust frequency 25 years 1939 - 1963			Arable land and land under permanent crops		Exposure to log ex- posure (F) %	Relative Quota for contrib. to UN %	Scale of Contributions to Locust Trust Fund			
	Swarms	Hoppers	Average	Total area '000 ha.	Subject to serious damage			1/2(G+H) %	I Adjst. to 15% for India	I Adjst. to 10% for India	K
A	B	C	D	E	F	G	H	I	J	K	
Afghanistan	14	10	12.0	9 015	30	32 454	0.89	1.70	1.80	1.91	
Algeria	19	15	17.0	7 066	100	120 122	1.77	2.30	2.43	2.56	
Bahrain	7	3	5.0	2	10	10	0.71	0.64	0.68	0.72	
Cameroon	8	0	4.0	2 637	20	2 110	0.71	1.28	1.35	1.44	
Central African Rep.	6	0	3.0	538	30	484	0.71	1.10	1.16	1.24	
Chad	21	12	16.5	1 700	100	28 050	0.71	1.60	1.69	1.80	
Dahomey	3	0	1.5	978	50	734	0.71	1.16	1.23	1.30	
Ethiopia	23	22	22.5	11 486	90	232 592	0.89	1.94	2.05	2.18	
France	17	8	12.5	5 310	100	2 390	0.71	0.38	0.40	0.42	
French Somaliland	3	0	1.5	870	30	1 218	0.71	1.22	1.29	1.37	
Ghana	7	0	3.5	160 860	20	627 354	35.99	19.60	15.00	10.00	
Guinea	20	19	19.5	16 850	80	276 340	3.04	3.30	3.54	3.69	
India	22	19	20.5	7 496	90	111 316	2.82	2.21	2.33	2.48	
Iran	18	15	16.5	389	100	5 057	2.66	2.36	2.49	2.64	
Iraq	14	12	13.0	1 360	40	1 088	1.70	1.20	1.27	1.35	
Israel	4	0	2.0	1 128	100	18 048	0.71	1.54	1.63	1.73	
Ivory Coast	17	15	16.0	1 696	100	29 680	0.71	1.60	1.69	1.80	
Jordan	19	16	17.5	-	100	-	0.71	0.38	0.40	0.42	
Kenya	17	15	16.0	270	70	472	0.71	1.20	1.27	1.35	
Kuwait	4	1	2.5	2 509	100	35 126	0.89	1.62	1.71	1.82	
Lebanon	16	12	14.0	1 801	100	27 916	0.71	1.60	1.69	1.80	
Libya	18	13	15.5	927	100	16 222	0.71	1.53	1.62	1.72	
Mali	19	16	17.5	8 564	100	145 588	2.89	2.68	2.83	2.99	
Mauritania	19	15	17.0	1 738	100	31 284	0.71	1.61	1.70	1.80	
Morocco	20	16	18.0	21 795	60	111 154	2.82	3.27	3.45	3.65	
Niger	14	3	8.5	13 400	90	271 350	3.04	5.24	5.54	5.86	
Nigeria (West)	23	22	22.5	100	100	50	0.95	0.83	0.88	0.93	
Portugal (Madeira)	1	0	0.5	5	100	25	0.78	0.74	0.78	0.83	
Qatar	7	3	5.0	210	100	4 515	1.24	1.64	1.73	1.83	
Saudi Arabia	23	20	21.5	5 500	100	66 000	0.89	1.80	1.90	2.01	
Senegal	15	9	12.0	3 662	50	3 662	0.71	1.35	1.43	1.51	
Sierra Leone	4	0	2.0	957	100	19 618	0.71	1.56	1.65	1.74	
Somali Republic	21	20	20.5	100	100	1 350	0.71	1.23	1.30	1.37	
Spain	17	10	13.5	250	100	100	0.71	0.92	0.97	1.03	
Spanish West Africa	3	1	2.0	7 100	20	102 240	1.20	2.02	2.13	2.25	
Canary Islands	24	24	24.0	6 381	60	70 191	0.89	1.80	1.90	2.01	
Sudan	12	10	11.0	9 362	80	78 641	0.71	1.72	1.82	1.92	
Syria	13	8	10.5	2 110	50	528	0.71	1.12	1.18	1.25	
Tanganyika	1	0	0.5	4 912	100	58 944	2.67	0.89	1.78	1.99	
Togo	13	11	12.0	25 348	25	28 516	7.09	4.79	5.06	5.35	
Tunisia	5	4	4.5	2 919	50	10 946	0.71	1.48	1.56	1.65	
Turkey	11	4	7.5	259	100	5 439	0.71	1.40	1.48	1.56	
Uganda	23	19	21.0	221	100	774	0.71	1.16	1.23	1.29	
United Kingdom	7	0	3.5	2 481	100	40 936	4.43	3.50	3.70	3.92	
Fed. of South Arabia	21	12	16.5	4 900	100	14 700	0.71	1.52	1.61	1.71	
Gambia	6	0	3.0	2 000	100	38 000	0.71	1.64	1.73	1.84	
United Arab Republic	21	17	19.0	-	100	-	100.00	100.00	100.00	100.00	
Upper Volta											
Yemen											
TOTALS						100.00	100.00	100.00	100.00	100.00	

APPENDIX XVISTATUS OF THE VARIOUS DESERT LOCUST REGIONAL ORGANIZATIONSCommission for Controlling the Desert Locust in North-West Africa

1. The Ninth Session of the Commission was held in Rabat, Morocco, from 9 to 12 June 1980.

The Commission:

- (a) reviewed the Desert Locust situation in the North-West African Region and in other Regions and concluded that summer breeding in West Africa will be on a limited scale;
- (b) requested the FAO Regional Locust Officer to make available the results of satellite imagery analysis of the distribution of rainfall in the Sahara. To this end a telex was regarded as indispensable and the Algerian delegation was requested to make the necessary arrangements for its installation;
- (c) hoped that the Secretariat would be equipped with a radio transmitter-receiver in order to ensure rapid communications with ground teams in the event of an invasion;
- (d) requested each of the countries to request their meteorological services to place stations in areas not already covered, in view of the need for meteorological data to complement satellite imagery;
- (e) requested the Secretariat to find sources of funds for research work other than those of the Commission;
- (f) noted with satisfaction the encouraging results obtained concerning locust control as a result of regional cooperation. It considered that the role of the Commission be extended to cover other important pests in the region and recommended that the prerogatives of the Secretariat of the Commission should be so extended;
- (g) noted with satisfaction the interest of the regional organizations OCLALAV and EPPO in its work;
- (h) approved the provisional accounts for 1979 as well as the programme of work and budget for 1980.

Commission for Controlling the Desert Locust in the Near East

2. The Tenth Session of the Commission was held in Rome, Italy, from 5 to 9 December 1979.

The Commission:

- (a) approved the consolidated statement of accounts for 1978 and the programme of work and budget for 1980;
- (b) stressed the need for the continuation of research work in the locust research stations of the Region and regretted that no research work was done in 1979;
- (c) recommended the Regional Locust Officer to visit these stations and study the conditions of each one and prepare a report on them which will be submitted to the Commission at its next session;
- (d) reviewed the payment of contributions by Member Countries and requested those who were in arrears to pay their contributions as soon as possible;
- (e) appreciated the work done by FAO in providing assistance in the field of training, survey and control;
- (f) recommended that FAO provide 20 % dieldrin and BHC solution to the People's Democratic Republic of Yemen to strengthen the potential of the locust project within available funds;
- (g) recommended that FAO keep an ample amount of insecticides in the eastern Region of the Arabian Peninsula, at Doha, to be held as a permanent store for locust control in that part of the Gulf States;
- (h) expressed its gratitude for the offer made by the Government of Iran for their willingness to provide two aircraft to assist in survey and control operations in the countries of the Arabian Peninsula. It also expressed the wish that this offer be made available in the future and requested FAO to take action in this regard;
- (i) appreciated the assistance of the United Arab Emirates to the Kingdom of Saudi Arabia, which included one aircraft which operated on the Tihama of Saudi Arabia during the winter - spring of 1978-79;
- (j) appreciated the offer made by the observer from the Desert Locust Control Organization for Eastern Africa to assist the Near East Region by providing one aircraft and recommended that it should be utilized when needed;
- (k) recommended that telex units be utilized in the Near East Region for the purpose of rapid communication and transmission of reports for the countries of the Region;

- (l) took note of the difficulties faced by the FAO Secretariat in obtaining assistance from the Near East Cooperative Programme to fulfil the plan of work which was suggested at the previous meeting of the Commission and reemphasized the need for such funds and recommended FAO approach other sources of funds in the Arab countries to provide assistance to the Commission;
 - (m) took note of the termination of UNDP Desert Locust project for Yemen Arab Republic and People's Democratic Republic of Yemen on 31 December 1980, and recommended that UNDP extend the project in view of the importance of maintaining FAO Locust Officers in these two countries; and felt that it was of vital importance to have these strategic areas adequately surveyed and controlled as they are high frequency areas for hoppers and adults and any reduction in survey and control activities could have serious effects in surrounding countries and regions.
3. The Eleventh Session of the Commission was held in Amman, Jordan, from 13 to 16 October 1980.

The Commission:

- (a) agreed to a 25 percent increase in the budget of Trust Fund 9409;
- (b) agreed to organize a joint survey of the border areas between Egypt and Sudan between December 1980 and March 1981;
- (c) agreed to strengthen the research facilities at Dokki Research Station, Egypt, and to allocate \$15 000 from the Regional Trust Fund for this purpose;
- (d) agreed to appoint a Locust Officer to cover the United Arab Emirates and the Sultanate of Oman, to be paid from Trust Fund 9409 for one year;
- (e) agreed to provide further assistance to the People's Democratic Republic of Yemen to the value of US\$20 000;
- (f) agreed to concentrate on short-term and group training;
- (g) agreed to organize a regional training course on Locust control, to be held in Yemen Arab Republic in 1981.

Commission for Controlling the Desert Locust in the Eastern Region of its Distribution Area in South-West Asia

4. The annual session of the Commission could not be held in 1979, and the next session will be held in Rome, from 10 to 14 November 1980.

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

5. The 25th regular Session of the DLCO-EA Council of Ministers took place in Kisumu, Kenya, on 28 and 29 March 1980.

The Council:

- (a) noted that the instrument of adherence to DLCO-EA will soon be deposited by the Republic of Djibouti with the depository Government of Ethiopia;
- (b) reviewed the Desert Locust situation within the Region and surrounding regions and concluded that there was no cause for serious concern but regretted the lack of information from the Red Sea coast of Ethiopia;
- (c) heard that there were serious armyworm outbreaks in Tanzania and Kenya and that outbreaks were expected soon in Ethiopia;
- (d) expressed their appreciation that the new post of Armyworm Forecasting Officer would be met by a contribution from the UNDP/FAO Action Programme for Improved Plant Protection for a period of one year;
- (e) welcomed the creation of the new post of Regional Plant Protection and Locust Officer for Eastern and Southern Africa and assured Dr. Farah of their Government's support in the work of the Programme;
- (f) expressed their appreciation of the work of the Management Consultancy Team which, inter alia, advised the Council to accept as part of its regular programme control operations against armyworm, Queslea and tsetse in addition to those against the Desert Locust, made important recommendations about the management of DLCO-EA and about the introduction of sound financial principles and adopted the report of the Team;
- (g) approved the Programme of Work for 1980-81, which had been prepared on the basis of the anticipated field operations of DLCO-EA;
- (h) approved a budget ceiling of \$3 810 170 for 1980-81.

Organisation commune de lutte antiacridienne et de lutte aviaire (OCLALAV)

6. The Administrative Council of OCLALAV took place in Bamako, Mali, on 10 - 12 July 1980.

The Council:

- (a) agreed to coordinate action together with the OICMA Administrative Council in order to hold a joint OICMA-OCLALAV extraordinary Administrative Council meeting in January 1981 in order to study the report of the ad hoc Committee. A similar decision has already been taken by the OICMA Administrative Council, held early September 1980 in Accra;

- (b) supported the extension of the West African Regional Bird Project to cover the countries of the humid zone in cooperation with ADRAO;
- (c) expressed satisfaction of the UNDP/FAO projects on the Desert Locust and grain-eating birds;
- (d) approved the programme of work and budget for 1981.