

Miss Hemsted

REPORT OF THE

Held in Rome, Italy
20-24 September 1971

**FIFTEENTH SESSION OF
THE FAO DESERT LOCUST
CONTROL COMMITTEE**



FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Meeting Report
No. AGP:1971/M/4

REPORT OF THE
FIFTEENTH SESSION OF THE
FAO DESERT LOCUST CONTROL COMMITTEE

Held in
Rome, Italy
from
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Food and Agriculture Organization of the United Nations
Rome, 1971

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INTRODUCTION

The Fourteenth Session of the FAO Desert Locust Control Committee, which was held in Rome from 12-16 October 1970, recommended (Report para.99) that its next session should be convened in October 1971 to be preceded by a three-day meeting of technical experts. In view of the various other sessions of the FAO bodies being held in Rome during that month, the Director-General of FAO decided to convene the meeting from 20 to 24 September 1971. He invited the following Governments to be represented by delegates at the Fifteenth Session:

Afghanistan	Niger
Algeria	Nigeria
Arab Republic of Egypt	Pakistan
Bahrain	People's Democratic Republic of Yemen
Cameroon	Portugal
Central African Republic	Qatar
Chad	Saudi Arabia
Dahomey	Senegal
Ethiopia	Sierra Leone
France	Somali Democratic Republic
Ghana	Spain
Guinea	Sudan
India	Syrian Arab Republic
Iran	Tanzania
Iraq	Togo
Israel	Tunisia
Ivory Coast	Turkey
Jordan	Uganda
Kenya	United Kingdom
Kuwait	United States of America
Lebanon	Upper Volta
Libyan Arab Republic	Yemen Arab Republic
Mali	
Mauritania	
Morocco	

He also invited representation of the United Nations Development Programme (UNDP) and the World Meteorological Organization (WMO). The League of Arab States, the Desert Locust Control Organization for Eastern Africa (DLCO-EA), the Organisation Commune de Lutte Antiacridienne et de Lutte Antiaviaire (OCLALAV) and the International African Migratory Locust Organization (OICMA) were invited as observers. In addition, he invited the following Governments and Organizations to send technical experts to take part in the three-day meeting which preceded the main session of the FAO Desert Locust Control Committee:

Arab Republic of Egypt	Morocco
Ethiopia	Sudan
France	United Kingdom
India	United States of America
Iran	

and DLCO-EA and OCLALAV.

The Session was opened by Dr. O.E. Fischnich, Assistant Director-General, who welcomed all the participants and briefly reviewed the subjects to be discussed and the action taken by FAO on the recommendations of the last session. Dr. Fischnich congratulated various national and regional organizations for their constant surveillance of their respective areas and for control of important locust populations which otherwise by now would have resulted in swarms. He hoped that this policy would be continued to save crops from the ravages of the Desert Locust. He, in particular, pointed out the need for making use of the fast developing technology concerning remote sensing and hoped that this would help to facilitate survey and control of this pest in future.

Officers of the Session

The Committee unanimously elected the following officers:

Chairman: Dr. Heshamul Huque (Pakistan)
Vice Chairman: Mr. J.W. Khacya (Kenya)

Drafting Committee:

Delegates of Arab Republic of Egypt, Iran, Ethiopia, Algeria, Mauritania and FAO Secretariat.

Gurdas Singh, R.M. Skaf, C. Hemsted, S.S. Pruthi and A. Khasawneh of the FAO Secretariat served as Technical Secretaries.

Acknowledgements

At the conclusion of the Session the members of the Committee expressed their keen appreciation of the efficient and tactful manner with which the Chairman and Vice-Chairman had conducted the proceedings. They also thanked the FAO Secretariat for the way in which they had performed their duties.

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

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AGENDA

1. Opening of the Session
2. Election of the Chairman and Vice-Chairman
3. Adoption of the Agenda
4. Election of the Drafting Committee
5. The Desert Locust Situation during 1970/71 and Forecast
6. (i) Anti-Locust Measures Undertaken by Various Countries and Regional Organizations (November 1970 to September 1971)
(ii) Emergency Action undertaken in Spanish Sahara
7. Progress Report of the UNDP(SF) Further Assisted Desert Locust Project (July - December 1970)
8. Consideration of the Report of the Technical Consultation
9. A Proposed Project for Training
10. Status of Various Desert Locust Regional Organizations:
 - (a) South-West Asia
 - (b) Near East
 - (c) Eastern Africa
 - (d) North-West Africa
 - (e) West Africa
11. Trust Fund 161 and extension of DLIS agreement with the Government of the United Kingdom.
12. Other Business.
13. Date and Place of Next Session
14. Adoption of Report.

SUMMARY OF DISCUSSIONS

The Desert Locust Situation and Forecast

Locust Situation - September 1970 to September 1971

1. General: Recession conditions had continued throughout the period under review. In general numbers had been low but in four areas a relatively threatening situation did occur; timely control action by national and regional organizations prevented resurgence of a new plague.
2. Western Africa: In western Africa there was widespread and prolonged breeding in 1970 in the Adrar des Iforas area of Mali. Substantial rain fell each month from July to September and laying probably continued until October. Extensive control was carried out between 7 September and 8 October against hopper bands, other hopper infestations and fledglings. Control had also been carried out in July and early August. Meanwhile widespread scattered breeding had been taking place in southern Mauritania. It is likely that some of the survivors from breeding both in southern Mauritania and the Adrar des Iforas moved into adjacent areas. If conditions had been suitable for survival and breeding, a dangerous situation might have developed. To check on this, special surveys were organized by FAO with the assistance of OCLALAV. In late January and early February aerial surveys were carried out and in late March and early April extensive ground and air surveys were mounted. At about the same time the Moroccan authorities carried out surveys of the border areas of their country. Virtually no locusts at all were found and, in general, conditions were very dry. However, in July two loose swarms were found in the interior or eastern Morocco near the Algerian border. This suggests that some locusts moved further to the north-east and bred in the interior draining wadis of eastern Morocco.
3. Small numbers of adults, almost certainly resulting from autumn breeding south of the Sahara, did survive in parts of western, central and southern Algeria. Rains in this area in the spring and early summer of this year (1971) had been poor and most of the adults reported had been immature. However, one small hopper population was found in early June in southwest of Tadmaït.
4. In the Adrar des Iforas area in late 1970, some adults persisted in the area and hoppers continued to be found until January 1971, especially in the western Tamesna area of Mali. A small amount of control was carried out in this area in January.
5. A small swarm was reported in Southern Mauritania in early August by a nomad. It had not been possible to confirm this report. Scattered mature adults in small numbers had been found at several places in southern Mauritania in August. Very few locusts were found in Mali and Niger during the summer of 1971. About ten hopper bands were reported in eastern Chad in August.
6. Eastern-Africa: Very few locusts were found in eastern Africa during the last half of 1970. However, during the first five months of 1971 numbers increased steadily on the Red Sea coastal plain of Ethiopia and the coastal plain of adjacent Sudan, culminating in the production of a number of small swarms in Eritrea in mid-May. From January to March, mixed populations of Desert Locusts and Locusta, but predominantly the latter, occurred in flood cultivations in a number of wadis along the Eritrean and southern Sudanese coastal plain, including the Tokar delta. Rain in these areas occurred in early January and again in March producing good conditions for survival and laying. These conditions lasted until early April. Hoppers were numerous in February and the

main fledging probably occurred in late February and early March. Control against the mixed populations in the Sudan, which in early March had reached densities of upto 20,000 adults per hectare in cotton and millet cultivations, was undertaken in mid-March and early April. The fledging concentrations found on the coastal plain of Ethiopia in the first week of May show that further laying by a substantial concentrated adult Desert Locust population must have occurred in mid-March. Probably this was the result of laying by a rapidly-maturing population from earlier locust breeding and possible breeding on the coastal plain of Sudan to the north. Late-instar hopper concentrations, including some bands, occurred over a gross area of 1,700 square kilometers, mainly in flood cultivations, on the Eritrean coastal plain in late April and early May, and fledging was largely complete over most of this area by mid-May. A number of small swarms were reported between 13 and 24 May moving inland and towards the south. No swarms were reported after 24 May and the hopper concentrations had disappeared by the end of May. By mid-June the non-swarmling adult population along the Eritrean coastal plain was declining rapidly as the area dried out.

7. In the Somali Democratic Republic scattered immature adults were present on the northern coastal plain in the early part of 1971. In late May and early June scattered mature adults were reported from both the northern coast and inland areas of Mijertein.

8. A small number of adults were found in the Darfur area of western Sudan in July and in the same month there was an unconfirmed report of a flight of locusts in the region of Khartoum. In August scattered adults were reported from several places in the Khartoum area. At the same time adults continued to be found on the Red Sea coastal plain of Ethiopia.

9. Near East: In the Arabian Peninsula, breeding during the winter and spring was, in the main, on a small scale. Scattered locusts in some numbers were found in the Jizan area of the Saudi Arabian Tihamah from November to February. However, the early months of 1971 were mainly dry and numbers declined during February and March. On the Tihamah of Yemen, on the other hand, numbers increased and control was required, mainly in cultivations north of Al Hudaydah, in February, March, April and early May. On the coastal plain of the People's Democratic Republic of Yemen there had been irregular breeding, mainly in cultivations, throughout the winter, spring and early summer. Numbers had been small on the whole but some control was carried out from January to March and again in May and August. There were exceptional heavy and widespread rains, mainly in the central and western interior of Saudi Arabia, in April. However, there appear to have been very few adults to take advantage of these conditions.

10. Heavy rain fell in the Dhufar area of Muscat and Oman in August 1970 and it was possible that breeding occurred there in consequence. Adult groups were reported in the northern interior of the People's Democratic Republic of Yemen in late December 1970 and a similar population was seen in the Hadramaut in late February. There was an unconfirmed report of a locust concentration, possibly Desert Locust hoppers, in the interior of Dhufar in March or April and adult Desert Locusts were reported from that region in early March. Groups of mature locusts were reported in early July from the interior of the People's Democratic Republic of Yemen near the Yemen border. These reports were too isolated and, mainly, too unreliable to argue confidently that a substantial population had been present in the interior of the south-west of the Arabian peninsula. However, most of the survivors from spring breeding in the Arabian peninsula were probably now in the wadis of the highlands and interior plains of the south-west.

11. South-West Asia: In south-west Asia exceptional late breeding occurred in 1970 following unusually heavy late monsoon rains. At Bikaner, for example, 117 mm. of rain fell in September compared with a mean total for that month of 33 mm. Hoppers were first reported in July and continued to be found until late December. Control was carried out against groups of hoppers and adults in December. A number of swarms were reported in November and December and at least one persisted in the breeding area until January.

Scattered adults in unusually large numbers persisted throughout the winter and spring in the Indo-Pakistan summer breeding area. Nonetheless, it was likely that most of the adults migrated generally westwards. The winter and spring rains in eastern Iran, western West Pakistan and southern Afghanistan were well below average, and spring breeding did not seem to have been at all successful. Small numbers of locusts were found in Afghanistan outside the previously accepted limit of the recession area.

12. In 1971 substantial rain had fallen much earlier than usual in the Indo-Pakistan summer breeding area. At Bikaner, for example, 73 mm. and 82 mm. fell in May and June respectively, compared with mean falls of 15 mm. and 33 mm. in those months. Heavy rain fell again in August. Laying began in May 1971 and it was likely that three generations would be produced. In August scattered adults and hoppers were reported from a number of places.

Forecast until end of Summer Breeding Season (1972)

13. There was no immediate danger of a new plague occurring. However, there were a number of areas where an upsurge might occur, which, if not checked, could lead to a dangerous situation. In Western Africa one or two small swarms have probably invaded southern Mauritania. These swarms would have dispersed and laid. A substantial hopper population might occur in this area including some bands. The adults which had given rise to the bands in Chad were probably the survivors from spring breeding in the coastal plains of the west of the Red Sea. If this was so, breeding, possibly on a large enough scale to produce some bands, might be in progress in Darfur and in parts of central Sudan. There was a risk that one or two small swarms would form. These were likely to move westwards in October or November probably finishing up in Spanish Sahara or southern Morocco. In addition scattered adults would invade the Red Sea coastal plains of Sudan, south-eastern Arab Republic of Egypt and Ethiopia in the near future. No locusts had been found in the Dessie escarpment, southern Danakil and Railway areas of Ethiopia but it was possible that some survivors from spring breeding to the north invaded these areas and that the breeding was in progress at some places. In the Arabian Peninsula scattered adults would invade the coastal plains of the south-west in the near future and start to breed. The scale of the invasion was difficult to predict but numbers could be large enough to allow a potentially dangerous situation to develop by next spring, if there were repeated good rains. The build-up in numbers in the Indo-Pakistan summer breeding area did not appear to have been rapid. However, the breeding season had been an exceptionally long one and it was likely that a widely dispersed low density population of hoppers and adults existed.

Anti-Locust Measures Undertaken by Various Countries and Regional Organizations (October 1970-August 1971)

14. During the period under report recession conditions continued although a number of countries had infestations (Map 2) of the kind, which if not controlled would have given rise to a number of swarms. The Committee noted with appreciation that timely action taken by various countries and regional organizations, in accordance with the long-term strategy of Desert Locust control, had averted the beginning of another upsurge. On the whole 3,317 sq.km. of infestation (adults and hoppers) were treated by using 24,146 kgs. of BHC dust, 6,600 kgs. of bait, and 44,175 litres of liquid insecticides; details of which are given in Appendix I.

15. The Committee emphasized the need for and the importance of maintenance of continuous vigilance by national and regional organizations over their respective important breeding areas during appropriate seasons and to keep themselves in readiness to undertake control operations against locust populations of significant importance. The Committee recalled the recommendation of its Twelfth Session, (Report, para 14) and emphasized the need for use of light traps during surveys.

Resources Available for Anti-Locust Operations

16. The Committee at its Twelfth Session requested FAO to keep under review the availability of resources for anti-locust operations with the various national and regional organizations. Accordingly, the information was collected and is given in Appendices VI and VIa.

Emergency Action Undertaken in Spanish Sahara

17. During the summer breeding season of 1970 there was considerable breeding in Mali against which extensive control operations were undertaken by OCLALAV. At that time it was expected that in the following months escapes from Mali and scattered adult populations from central Mauritania would accumulate mainly in southern Spanish Sahara and adjacent parts of Mauritania. In the wake of favourable and adequate spring rains extensive breeding was feared to have taken place in these areas resulting in a dangerous situation (para 2). Since adequate arrangements did not exist for survey and control in Spanish Sahara, it was considered necessary to take appropriate steps to get this area surveyed during the spring of 1971 and also to provide for control operations if considered necessary.

18. Under the provisions of Resolution 17/69 of the Fifteenth Session of the FAO Conference "Authority of the Director-General to undertake Emergency Action for the Control of Livestock Diseases and to carry out Initial Control Activities against the Desert Locust in Emergencies", the Director-General, on the recommendation of the Advisory Panel of Experts set up to advise him on initial control activities against the Desert Locust in emergencies and after consultation with the Chairman of the Finance Committee, decided to authorize the withdrawal of upto \$50,000 from the Working Capital Fund for initial control activities involving the purchase of insecticides and cost of aerial and ground survey and control.

19. It was considered appropriate that such surveys and control operations could best be undertaken by the OCLALAV staff who had the required experience and equipment for this purpose. In order to organize and coordinate the work between OCLALAV and the Spanish Sahara authorities, FAO appointed Mr. J. Roy as Consultant for this purpose and initially committed an amount of US\$7,000 to cover the cost of aerial and ground surveys.

20. Accordingly, surveys were undertaken in Spanish Sahara in two phases, i.e. an exclusively aerial survey to locate green zones between 18 and 25 February 1971 and a combined aerial and ground survey from 1 March to 20 April 1971 (Map I).

21. The ground surveys revealed that there was no locust infestation or breeding in the area; thus no control operations were undertaken as previously envisaged. A total amount of US\$ 8,500 was incurred towards the operating cost of both aerial and ground surveys undertaken by the OCLALAV staff in collaboration with the anti-locust team of the Spanish Sahara.

22. The Committee noted with appreciation that the action taken by FAO facilitated to assess the actual locust situation in the area and in a way helped to promote interest of the Spanish Sahara authorities in the field of anti-locust operations. The Committee was encouraged to note that the authorities had already ordered two vehicles, two radios, two exhaust nozzle sprayers and a reasonable quantity of insecticide for their use in future campaigns.

Progress Report of the UNDP(SF) Further Assisted Desert Locust Project
(1 July to 31 December 1970)

23. In accordance with the recommendations of the Special Conference of the UNDP(SF) Project (Rome, November 1966), the Eleventh Session of the FAO Desert Locust Control Committee approved proposals for a further extension of the UNDP Assisted Desert Locust Project from 1 May 1968 to 30 June 1970 to permit implementation of certain stated objectives of the Project which it had not been possible to complete during the period from 1960 until 1968. The Project was further extended for six months, i.e. until 31 December 1970 for winding-up purposes. A progress report was submitted to the Fourteenth Session of the FAO Desert Locust Control Committee for the period covering 1 May 1969 to 30 June 1970. The present review covers the remaining period of six months, i.e. from July to December 1970.

Reporting and Forecasting

24. National Services: During July to December 1970, the FAO Radio Communications Officer paid visits to the People's Democratic Republic of Yemen, Yemen Arab Republic and Syria to inspect and install the radio equipment supplied under the Project. He also visited FTE Telecommunications in Cambridge, United Kingdom, for examining some of the latest models which could be considered for future orders.

25. Desert Locust Information Service (DLIS): The Desert Locust Information Service (DLIS) continued to provide the usual monthly locust situation summary and forecast to the Governments and organizations concerned. At the Fourteenth Session of the FAO Desert Locust Control Committee (Report, para.56) it was decided that a new layout of the monthly summary consisting of a general introduction intended to be of interest to everyone and two detailed sections laid out by regions and by areas or countries, one dealing with the current situation and the other with the forecast, should be used for a trial period of six months. The first issue of the Summary with new layout appeared in November 1970. The new layout was well received and had since been adopted.

26. The Committee was informed that the ALRC had been amalgamated with certain other research institutes to form a new United Kingdom research centre known as the Centre for Overseas Pest Research. This new arrangement would in no way affect the locust research of the Centre, including DLIS.

Survey and Reconnaissance

27. Under this chapter, provision was made for operations in various regions which could not be adequately surveyed with the limited resources of the national and regional organizations concerned. The following surveys were undertaken during the period under review:

<u>Date</u>	<u>Area</u>	<u>Participating Teams</u>
September/October 1970	Mauritania	Algeria - OCLALAV
November 1970	Mali	Algeria - OCLALAV
December 1970	Southern Tihama	Saudi Arabia

Training

28. Advanced Training: Mr. M. Nacro (Upper Volta) was pursuing his studies at Orsay, France; Mr. K.J. Musa (Somali Republic) and Mr. A.M. Karrar (Sudan) continued their studies at the Imperial College, London, United Kingdom.

29. Training in Survey Techniques: Several senior and junior staff of OCLALAV and Algeria and OCLALAV were trained by Professor Pasquier in survey techniques during the special surveys undertaken in Mauritania (September-October 1970) and Mali (November 1970).

30. Training in Aerial Spraying: Mr. A. Moncourt and Mr. S. Tall, both of Mali, and Mr. A.N. Kone from Senegal, all serving as pilots with OCLALAV, had completed their three months training in France in aerial spraying and returned to Dakar by the end of August, 1970.

Research

31. Field Research Stations: Close contact was maintained with the field research stations with the view to assisting them in their current work and future programmes. Two further issues of the Technical Series, containing completed work of the various field stations, had been published.

Disposal of Equipment:

32. Action was taken to complete the transfer of equipment supplied under the Project to the recipient countries and regional organizations. The following was the general situation:

- a) All items delivered and already transferred
Afghanistan, Algeria, Israel, Tunisia
- b) All items delivered, lists sent to governments or regional organizations, for completion of transfer
Abu-Dhabi, Arab Republic of Egypt, Bahrain, Chad, DLCO-EA, Dubai, Ethiopia, Iraq, Jordan, Kenya, Libya, Morocco, Niger, OCLALAV, Saudi Arabia, Syria.
- c) Some items still to be delivered. Delivery and transfer expected to be completed by end of 1971.
India, Iran, Mali, Mauritania, Pakistan, Qatar, People's Democratic Republic of Yemen, Somalia, Sudan, Yemen Arab Republic.

33. The Committee, while noting that the UNDP(SF) assisted Desert Locust Project concluded successfully on 31 December, 1970, expressed its appreciation of the very valuable assistance provided by the UNDP and FAO over the past ten years and recognized that the various advancements and a very considerable degree of international cooperation in every sphere of the Desert Locust Research and Control, which existed today, were made possible through this Project.

Technical Matters

34. The Committee considered various technical matters which were discussed in detail by a group of experts prior to its session and adopted the recommendations contained in paragraphs 35 to 48.

Reporting on Desert Locust Populations not in Swarms or in Hopper Bands

35. The Committee considered the various suggestions put forward during the discussions on the above subject and decided that the present proposed form should be slightly amended and a revised version (Appendix I) be adopted. This, however, did not prevent any organization from giving additional information when possible.

Low Aerial Photography for Desert Locust Surveying

36. The Committee appreciated the report submitted by FAO on the present status of techniques and results so far obtained by low aerial photography for Desert Locust surveying (LAPS) and noted that LAPS had reached a technological level where it was possible to envisage its use for assessment of Desert Locust populations as a complementary method to ground surveys, and more particularly in areas difficult of access, and agreed that further development work should be directed with the following points in view:

- a. Calibration of the photographic locust density (PLD) versus precise ground locust density (GLD) counts in a large variety of conditions with a view to establish correlation coefficients in well-defined habitat conditions between PLD and GLD. It was felt that information which should be collected during flights on micro-meteorological and general weather observations, to link with precise descriptive data on vegetation, should permit the correction of PLD values so that good estimates of true ground densities could be obtained.
- b. To establish proper sampling procedures. Other sources of locust information should be borne in mind and the experience of field locust officers well acquainted with the areas to be surveyed would be a valuable asset to LAPS. Training of such officers in LAPS methods should be given great attention during the forthcoming development work on LAPS.
- c. Skill in screening of the photographs for locusts and the related data on vegetation cover, soil humidity, etc. requires a high standard of eye-sight and also needs a high degree of motivation, which is usually a pre-requisite for field work. However, field experience for screening personnel was not a sine qua non. It was considered that women workers might show adequate capability for stereoscopic screening of aerial photographs and this suggestion might be given a trial during forthcoming development work. Considering the low cost of personnel and its availability in countries affected by the Desert Locust, it was considered desirable to build up an adequate number of screeners rather than to go in for automatic devices for the time being.
- d. Training personnel for the use of camera and other equipment, photo interpretation, etc. should form a part of the proposed trials.

37. The Committee agreed that further development work be undertaken in close collaboration with the Desert Locust Control Organization for Eastern Africa (DLCO-EA) taking due care to bring LAPS upto operational level in the shortest possible time. After consultation with DLCO-EA and the Saudi Arabian Government, the work may be extended to the Eastern side of the Red Sea Coast provided suitable targets were available there.

38. Subject to further encouraging results during the forthcoming operations, it was agreed that FAO should acquire the necessary equipment and make it available, possibly to DLCO, who had suitable aircraft and other facilities to undertake this work in future. It was understood that it would be necessary to provide training to appropriate personnel in the various specialized fields and to provide consultants at the time of the operation whenever considered appropriate. It was further agreed that any expenditure in this respect could be met from Trust Fund 161.

39. The Committee emphasized the need for further ecological work, in relation to locust behaviour, in some of the important habitats of the Desert Locust and recommended that this work should be included in the work of the Special Surveys being undertaken regularly in various areas.

Cost Benefit Estimates of LAPS Operations

40. The Committee considered the report on cost benefit estimates of LAPS operations and recognized that benefits of LAPS could not be expressed strictly in terms of direct comparison with existing survey methods, because the type of information yielded by LAPS might be valuable in circumstances when the time factor prevented adequate sampling and more particularly, where sampling of areas inaccessible from the ground was concerned. The cost of LAPS had to be viewed from a much broader angle and in relation to the benefits to be derived from such information. The Committee was of the opinion that, at this stage, LAPS could only supplement and not replace the present methods of survey.

Locust Identification Handbook

41. The Committee noted with appreciation the Locust Identification Handbook prepared by the Centre for Overseas Pest Research and considered it as a useful guide for field locust personnel especially during Desert Locust surveys.

Research on Locust Resistance to Insecticides

42. The Committee noted with great interest the work being undertaken by Mr. M. Shafi, FAO fellow and Phillip Hunter-Jones (COPR, London) on resistance to insecticides amongst locusts. The Committee noted that the present laboratory investigations were of a preliminary nature and it was too early to draw any conclusions in relation to control.

Wind-flow on the Red Sea Coastal Plain of Saudi Arabia

43. The Committee noted with interest the work undertaken by the Centre for Overseas Pest Research in collaboration with the Desert Locust Research Station in Jeddah on the wind-flow on the Red Sea Coastal Plain of Saudi Arabia during 1970. The evidence of locust distribution suggested that locusts flying as individuals at night could move north even when the Red Sea Convergence Zone over the sea at mid-day lay to the south of Jeddah. The diurnal change in the structure of the wind-flow on the coastal plain proved to be complex but a possible mechanism for northward movement was shown to exist. The Committee noted that the hypothesis put forward, however, needed the support of the actual presence of locusts in the field, which study might be possible in future work.

Systemic Action of an Insect Feeding Deterrent

44. The Committee heard with interest the research work undertaken by Mr. Gill on feeding deterrents. Several chemicals were tested for repellency against the Desert Locust but only the neem (*Azadirachta indica*) derivatives proved promising. The investigations led to the discovery of the systemic uptake of neem in plants and its hormone-like property of disrupting larval growth in many insect species. The behaviour of nematodes and fungi would also appear to be affected: there was less infection on treated plants. The chemical(s) was readily translocated in many plants including wooded species, was highly persistent and withstood leaching under heavy simulated rain. Mr. Gill postulated the use of neem to control internal tissue borers, sucking insects like white flies, vectors like mosquitoes and flies and possibly, even nematodes, fungal and bacterial diseases. Besides the results of his own preliminary experiments, he supported his claim by several records of the application of neem oilseed cakes resulting in improvement in quality in addition to yield of sugarcane, cotton and rice crops. He also quoted the results of several research papers about the efficacy of neem applications against lepidopterous and stored grain pests. Neem was said to possess many insecticidal and medicinal uses in India.

45. Certain modern pesticides constituted one of the major hazards of environmental pollution. An alternative to their use should be a welcome step forward. The Committee observed that the neem derivatives showed a great promise of further development for use in an integrated pest management programme and recommended that this line of work should be continued. The Committee further recommended that the present findings should be brought to the notice of the Member Countries to stimulate further research and testing. The contribution of Mr. Gill was commended and highly appreciated.

Control of Locusts by Insecticides

46. The Committee once again drew attention to the need for finding alternate insecticides and the importance of carrying out laboratory and field trials of some new compounds and recommended that this work be carried out wherever facilities were available. The Committee appreciated the interest of the Institute National de Recherche Agronomique (INRA), Paris, to undertake research on this problem. At the same time, it noted with satisfaction that a project on Study of Toxicology and Residue Implications of Using Alternative Chemicals for Locust Control had been established to undertake research at DLCO-EA Headquarters in Addis Ababa and hoped that, in view of the importance of this work, additional resources and staff would be available to expand the work, particularly on finding alternative compounds. The Committee's attention was drawn to the development of a new chlorinated hydrocarbon insecticide Petkolin-M,¹ which was reported to have low mammalian toxicity. The various Desert Locust field research stations might consider trying this new compound against the Desert Locust. The Committee noted with interest that M. Nacro has completed his studies concerning insecticides and will soon be going back to OCLaLAV to be in charge of the laboratory which had been equipped under the UNDP(SF) Desert Locust Project. The Committee recognized the need for exchange of information on the above work between the various Institutes and field research stations and requested FAO to take appropriate steps in this respect.

47. Recognizing the need for training of personnel in this specialized research work and its allied aspects, the Committee recommended that in future high-level fellowship awards consideration should be given to select subjects to cover the above study. Such consideration was also justified in view of the encouraging results in the field of anti-feedants obtained by an FAO Research Fellow (see paragraphs 10,11). The Committee noted that COPR had prepared simple instructions for bio-assay of soil residues of pesticides and had agreed to pass these on to FAO for further distribution.

Effect of Sub-Lethal Dosage of Dieldrin in Locust Progeny

48. The Committee noted with interest the work undertaken by Mr. A. Nacro, FAO fellow, at the Entomology Laboratory of the Faculté des Sciences d'Orsay (France) on the effect of sub-lethal doses of Dieldrin applied on specific parts of the body of the Desert Locust adults and hoppers. Such research work was of particular interest, and might facilitate progress towards increased efficiency of spraying techniques thus making a contribution towards reduction of environmental contamination. It was recommended that research work on this subject should be continued both in laboratory and in field.

TRAINING PROJECT IN DESERT LOCUST CONTROL AND RESEARCH

49. The Thirteenth Session of the FAO Desert Locust Control Committee (Report, para.44) agreed to examine at its next session the future requirements of the various countries with regard to training of personnel on various aspects of the Desert Locust problem. Accordingly, FAO collected the necessary information from all the countries concerned and presented it to the Fourteenth Session of the FAO Desert Locust Control Committee for its consideration and advice for future action.

¹ (available from: Pakistan Council of Scientific Industrial Research, Karachi)

50. The Committee, at its Fourteenth Session, examined the requirements of the various countries and emphasized the need for continuous training which, in its view, was the only way to enable the various anti-locust personnel to make the best use of the available resources both for research and control and at the same time to keep them abreast with the fast developing modern techniques. For this purpose it was considered necessary to prepare a comprehensive and well coordinated scheme on national, regional and international basis after a thorough study of individual requirements of the various countries.

51. In accordance with the recommendations of the FAO Desert Locust Control Committee (Report, paras 86-88), FAO as a first step collected information about some 373 individuals who were trained on various aspects of the Desert Locust problem from 1960 to 1970 a summary of which is given below:

South-West Asia

<u>Subject</u>	<u>Number of Trainees</u>	<u>Period in weeks</u>	<u>At present engaged in:</u>	
			<u>Locust work</u>	<u>Other job</u>
*Training courses	32	4-7	26	6
Survey and control organization	27	4-14	24	3
Plant Protection and locust control	3	12	3	-
Locust meteorology	3	2	2	1
High-level (Research)	7	3-5 yrs	5	2
Radio maintenance	5	36-72	5	-
Exchange visits	5	2-4	3	2
Aircraft maintenance	3	24	3	-
Aerial spraying	<u>5</u>	1-4	<u>5</u>	-
	90		76	+ 14

Near East

Locust research (short term)	3	6-40	2	1
Survey and control organization	35	4-18	31	4
Aerial spraying	5	1	3	2
High-level (Research)	4	1-3 yrs	3	1
*Training courses	46	2-8	38	8
Locust meteorology	7	2-12	6	1
Exchange visits	8	4-6	7	1
Radio maintenance	<u>10</u>	12	<u>10</u>	-
	118		90	+ 18

* see page 22

Eastern Africa

<u>Subject</u>	<u>Number of Trainees</u>	<u>Period in weeks</u>	<u>At present engaged in:</u>	
			<u>Locust work</u>	<u>Other job</u>
*Training courses	26	6-10	23	2
Survey and control organization	17	4-24	13	4
Exchange visits	9	8	7	2
Radio maintenance	3	24-40	3	-
High-level (Research)	1	44	-	1
Locust meteorology	<u>6</u>	52	<u>5</u>	<u>1</u>
	62		51	+ 11

North-West Africa

*Training courses	22	4-8	20	2
Survey and control organization	4	4-12	3	1
Exchange visits	2	8	2	-
Radio maintenance	2	12	2	-
Locust meteorology	1	12	1	-
Aerial spraying	<u>1</u>	1	<u>1</u>	<u>-</u>
	32		29	+ 3

West Africa

*Training courses	24	4-8	23	1
Survey and control organization	9	4-14	9	-
High-level (Research)	5	1-3 yrs	5	-
Short term (Research)	1	12-30	1	-
Radio Maintenance	3	12	3	-
Locust meteorology	<u>1</u>	2	<u>1</u>	<u>-</u>
	43		42	+ 1

* see page 22

Europe (France, Israel, Turkey, U.K.)

<u>Subject</u>	<u>Number of Trainees</u>	<u>Period in weeks</u>	<u>At present engaged in:</u>	
			<u>Locust work</u>	<u>Other job</u>
Research (short term)	4	6-42	4	1
Aerial spraying	2	1	2	-
Locust Meteorology	1	2	1	-
Training courses	<u>21</u>	6-8	<u>18</u>	<u>3</u>
	28		25	+ 3

* Training courses: Locust biology, ecology, biogeography, control and survey techniques, reporting and plotting procedures, organization and administration of control campaigns.

52. The Committee noted with satisfaction that from the follow-up information received from about 373 trainees, approximately 323 were still engaged in locust control, survey or research and allied subjects. In such a vast training programme it was expected that a certain percentage of trainees would not remain in the field of work for which they were trained. Such background information was considered necessary to facilitate consideration of a future training project. Simultaneously information was collected on the needs of the various countries over the next six years (1972-1977) with details on: the type of training required and its level; education-background; language requirements of the individuals concerned, etc. Unfortunately, this information was not as complete as was intended but was sufficient to formulate a programme with some sort of flexibility as might be necessary on the receipt of more complete information.

53. After full consideration of the future requirements the Committee ^{at its 15th Session held in Paris, Sept. 15-21} agreed that training could best be provided by grouping the prospective trainees into various levels, i.e. first and second category would be those who could participate in training courses on a regional basis, each course using one specific language, ^{and} others who could be awarded short-term fellowships to visit other countries and institutes in groups having the same language requirements. The third category could be for those candidate who were to be granted individual fellowships either of short or medium term duration (3-12 months). The fourth one for high-level individual training in which case trainees were to be admitted to certain universities for a period of two years or more. The fifth category was concerning training which could best be organized by arranging advisory visits of consultants to train people on the spot, or by providing in-service training on various aspects of the Desert Locust problem. In addition there would be special courses in radio maintenance and aerial spraying techniques which would again be divided up into short and long-term courses and according to different language requirements.

54. While agreeing to the need for future training on various aspects of the Desert Locust, some Member Countries requested FAO to explore the possibility of extending the scope of training to cover other locusts and crop pests, as far as practicable, and requested FAO to enlist the cooperation of various Plant Protection bodies concerned to achieve this end. The Committee also recognized the need for a detailed plan of operation, and decided that on receipt of the UNDP's approval of the above project, FAO should prepare a detailed programme in consultation with the experts on the relevant subjects.

55. The Committee unanimously endorsed the draft Project and requested UNDP for provision of funds as detailed below:

UNDP Contribution per year

1.	<u>Project Personnel</u>		
	a. <u>Experts</u>		
	Director of Training	12 m.m.	\$ 30,000
	Technical Officers (3)	36 m.m.	90,000
	Operational Officer (Training)	12 m.m.	30,000
	Consultants	12 m.m.	30,000
			<hr/>
			\$ 180,000
	b. <u>Administrative Support Personnel</u>		
	Technical Assistants (3)	36 m.m.	\$ 25,000
	Clerk/Stenographer	12 m.m.	15,000
			<hr/>
			\$ 40,000
2.	<u>Sub-Contracts</u>		
	Personal Services		\$ 20,000
3.	<u>Training</u>		
	Individual Fellowships		\$ 73,700
	High-Level Fellowships		165,500
	Group Fellowship Study Tours (3)		77,000
	Group Training Courses (7) (including travel and subsistence of lecturers and trainees)		161,000
			<hr/>
			\$ 477,200
4.	<u>Equipment</u>		
	Laboratory equipment (to be purchased during 1st yr.)		\$ 20,000
	Audio, visual " " " " " "		20,000
	Radio Maintenance training equipment " " "		15,000
	Survey & Control Demonstration " " "		15,000
	Miscellaneous, transport, etc. " " "		20,000
			<hr/>
			\$ 90,000
			<hr/>
			Carried forward:- \$ 807,200

	brought forward:-	\$ 807,200
5. <u>Sundry</u>		
Postal and Cable Charges	}	
Contingencies	}	5,000
	Total Project Costs per year:	\$ 812,200
6. <u>Agency Costs</u> (13%)		\$ 105,600
		\$ 917,800

Participating Governments Contributions

Annual counterpart contribution in cash
(15% of expert costs to be paid from Trust Fund 161) \$ 27,000

Counterpart contribution in kind for six years.
(Building, local staff and transport facilities) \$ 650,000

The total funds requested for the project over the six year duration is
\$ 4,638,800 details of which are given in Appendix II.

56. The Committee noted with satisfaction that FAO had forwarded the draft Project to the UNDP. The UNDP representative confirmed the continued interest of the Administration in supporting training schemes and the need for further training was recognized. The magnitude of the present proposal, the present financial stringency on the availability of UNDP funds for regional and inter-regional projects, and, perhaps, the desirability of reviewing in detail the relevance of past training experience to future requirements, suggested that the proposal might first be examined by an expert group which should also include a training specialist (para.54 reflects the Committee's view).

Status of Various Desert Locust Regional Organizations

South-West Asia

57. The Seventh Session of the Commission for Controlling the Desert Locust in the Eastern Region of its Distribution Area in South-West Asia was held in New Delhi, India, from 15 to 18 February 1971 and was preceded by a three-day Session of its Executive Committee. The Commission reviewed the locust situation within the region and in the neighbouring countries and recommended that the Member Countries should continue to keep their respective potential breeding areas under strict vigilance and emphasized the need for controlling any remanent swarm populations which might be present in the winter/spring breeding areas of Pakistan and Iran.

58. In view of the present locust situation the Commission did not envisage any changes in the budget as approved at its last session and adopted the programme of work and budget for 1971. It was agreed that if any additional funds were needed, particularly in respect of training and emergency action, such expenditure could be met from the unobligated cash balance of Trust Fund 123.

59. Mr. A.A. Soltani of Iran was selected for high-level fellowship and further awards of short-term fellowships and exchange visits were recommended. The Executive Committee made several recommendations on field research programmes and, in particular, stressed the need for continuing research of applied nature. The report of the Commission (No.AGP/1971/M/1) had been printed and circulated.

Near East

60. The Second Session of the Commission for Controlling the Desert Locust in the Near East was held in Beirut, Lebanon, from 26 to 29 April 1971, and was preceded by a three-day Session of its Executive Committee. The Commission reviewed the locust situation and stressed the need for continuous vigilance in the important breeding areas during appropriate season. Control of any populations likely to result in gregarization was considered vital to maintain the present recession.

61. The Commission requested FAO to promote, in collaboration with the League of Arab States, further cooperation and coordination in the Desert Locust survey and control in the eastern Arabian states.

62. Two suitable candidates, one from the People's Democratic Republic of Yemen and another from Sudan, were selected for high-level fellowships.

63. The Commission approved the budget and programme of work for 1971 and 1972 and also agreed to allocate an amount of \$10,000 per annum for survey and control operations in the People's Democratic Republic of Yemen.

64. The Committee appreciated the contribution made by the Government of Pakistan by deputing two self-contained teams: one to survey important breeding areas of Oman and Trucial States and another for eastern Saudi Arabia and hoped that the Government would continue this useful work in future.

Eastern Africa

65. The Desert Locust Control Organization for Eastern Africa (DLCO-EA) continued to operate with the usual efficiency. Since the last session of the FAO Desert Locust Control Committee, the Council of the DLCO -EA had its Sixteenth Regular Session and stressed the need for effective and continued vigilance and survey by air and ground to keep the present low level of the Desert Locust populations. Close cooperation between FAO and DLCO-EA was continued in accordance with the Relationship Agreement between the two Organizations. The FAO/SIDA Project on "Study of Toxicology and Residue Implications of Using Alternative Chemicals for Locust Control", which was scheduled to commence in July 1971, was delayed and would now be operational in October 1971. The Committee noted with interest that the present Convention establishing the Desert Locust Control Organization for Eastern Africa had been further extended for a period of 5 years from August 1972 and also noted that the Headquarters of DLCO-EA would be shifted from Asmara to Addis Ababa.

North-West Africa

66. The Fifth Session of the FAO North-West African Desert Locust Research and Control Coordination Sub-Committee was held in Tunis, Tunisia, from 5 to 8 April 1971.

The Sub-Committee:

- a. considering that special surveys undertaken during 1970/71 had yielded valuable results, requested FAO to explore the possibility of organizing such surveys in future whenever appropriate;
- b. appreciating the assistance provided by the UNDP in making funds available for financing the Secretariat of the Commission during 1971, emphasized the need for continuation of this financial support which was considered vital for successful functioning of the Commission;

- c. noted with appreciation that the emergency action taken by FAO in Spanish Sahara helped in keeping the Desert Locust population at a low level. It, however, considered that efforts should not be relaxed and recommended that continued vigilance should be maintained and all Governments should take proper measures to ensure control of any future infestations.

67. The Committee noted with interest that the Commission for Controlling the Desert Locust in North-West Africa had been formally established as from 17 August, 1971 and the work previously carried out by the Sub-Committee would, in future, be the responsibility of the Commission. In accordance with recommendations of the Fifty-Fifth Session of the FAO Council (report, para.236), the Committee considered that it was not necessary to continue the Sub-Committee and unanimously agreed to dissolve it.

West Africa

68. The 'Organisation Commune de Lutte Antiacridienne et de Lutte Antiaviaire (OCLALAV)' continued to operate as an independent inter-governmental organization and kept FAO closely informed of its activities. OCLALAV participated in a special aerial and ground survey organized by FAO in Spanish Sahara.

69. The Committee recognized the importance of anti-locust operations carried out in the countries south of the Sahara by OCLALAV and emphasized that, in order to maintain these operations at the present level, it would be necessary to provide additional support to OCLALAV for which UNDP had already been approached. In the overall interest of Desert Locust survey and control, the Committee urged the UNDP to provide the necessary assistance as soon as possible.

International Desert Locust Trust Fund 161

Financial Report

70. The Committee was informed that the Trust Fund was established as of 1 July 1966 and contributions were received through the years 1966-1971. Most countries invited to contribute had done so by 1969 and continued their payments through 1970 and 1971. Since the UNDP(SF) Desert Locust Project was extended beyond June 1966, all expenditure planned to be met in the years 1966-67 from the Trust Fund was instead borne from the Project funds; consequently savings were accumulated for future use in the Funds in Trust. The Eleventh Session of the DLCC approved proposals for further extension of the UNDP Project from May 1968 to 30 June 1970 and agreed that for that period the receipts of the FAO International Desert Locust Trust Fund should be treated as the counterpart cash contribution of the Governments towards the UNDP (Special Fund) Project. Accordingly, the Committee at the same Session approved a budget for the Trust Fund for a period of three years commencing 1 January 1968 based on the contributions pledged by the various Governments (para.61 of the Report). Since the UNDP Desert Locust Project was further extended upto the end of 1970 and this also had a bearing on the counterpart contribution to be met from the Trust Fund, it had not been possible to submit any statement of accounts earlier than at the present session of the Committee.

71. In accordance with the recommendation of the Ninth Session of the FAO Desert Locust Control Committee, the Committee reviewed the budget of the Trust Fund 161 along with a financial report on income and expenditure. The expenditure incurred under the Trust Fund 161 from its inception to 31 December 1970, as given in Appendix III, was considered in order.

Contributions

72. The Committee, at its Fourteenth Session (Report, para.98), requested the Director-General to write to the Governments who were in arrears to expedite payments and to approach the Governments who had not yet pledged contributions to the Trust Fund to do so. Accordingly, the Governments concerned were approached and in response the governments of Ethiopia, Ghana, Sudan, Syria, Tunisia paid their arrears in full or in part. Arrears prior to 1970 were still outstanding from Chad, Mali and Mauritania. Details of the contributions received as at 31 August 1971 are given in Appendix IV.

73. The Committee referred to its earlier recommendation (Fourteenth Session, para.97) concerning the budget of the International Trust Fund from 1971 onwards and unanimously agreed that it was not necessary to increase the contributions of the Member Countries as given in Appendix IX and these contributions should be maintained at the present level until such time that the Committee might consider reviewing the scope and enlarging the terms of reference of the Fund.

Reserved Fund

74. The Committee, at its Ninth Session (Report, para.87), decided that any unobligated balance of the Trust Fund should be accumulated as a reserve upto \$200,000. The saving as on 31 December 1970 had reached this target although since then considerable sums had been spent which had again reduced the balance below \$200,000. The Committee agreed that for the present the agreed level of the reserve fund (US\$200,000) should be maintained and the question of raising the limit of such a fund should be considered at its next session.

DLIS

75. The Committee noted that as of 1 July 1966, FAO entered into a five-year arrangement through exchange of letters with the Government of the United Kingdom for the preparation and circulation of monthly Desert Locust situation summaries through the Anti-Locust Research Centre, now Centre for Overseas Pest Research (COPR), London, on payment of \$20,000 per annum. This amount was partly paid from the UNDP(SF) and partly from the Trust Fund 161 over the five years from 1 July 1966 to 30 June 1971. Since the UNDP(SF) Desert Locust Project had concluded, the contribution to the DLIS had to be financed totally from the Trust Fund and accordingly \$20,000 were earmarked for this purpose in the annual budget adopted (Appendix V) by the Fourteenth Session of the DLCC. As the exchange of letters between the Government of the United Kingdom and FAO expired on 30 June 1971, FAO had made interim arrangements with the United Kingdom Government to continue DLIS work on the same terms and conditions for a further period of one year. This was done in order to ensure the continuation of the work of DLIS and to allow time to complete formalities for such future arrangements as might be decided by the Committee.

76. The Committee considered the extension of the existing arrangements between FAO and the Government of the United Kingdom for the DLIS and decided that it was necessary to review the functioning of the Service. This review would be organized by FAO and the members of the review body should be drawn from the interested governments, and the regional organizations after the question had been considered by the various Commissions and Organizations at their next respective sessions wherever possible. It was pointed out that it would be necessary for the review body to visit London to survey the structure and operation of the DLIS as part of the survey. The report of the review body shall be submitted to the Technical Consultation prior to the Sixteenth Session of the DLCC and then considered by the latter body who will decide on the future action considered necessary. Until the outcome of the review, FAO is empowered to negotiate with the Government of the United Kingdom interim arrangements to ensure the continuation of DLIS. In the event of the review body suggesting fundamental alterations to the existing arrangements, which might be recommended by the DLCC, the FAO and the United Kingdom will arrange so as to allow adequate time for all parties to implement the recommendations.

Trust Fund 1

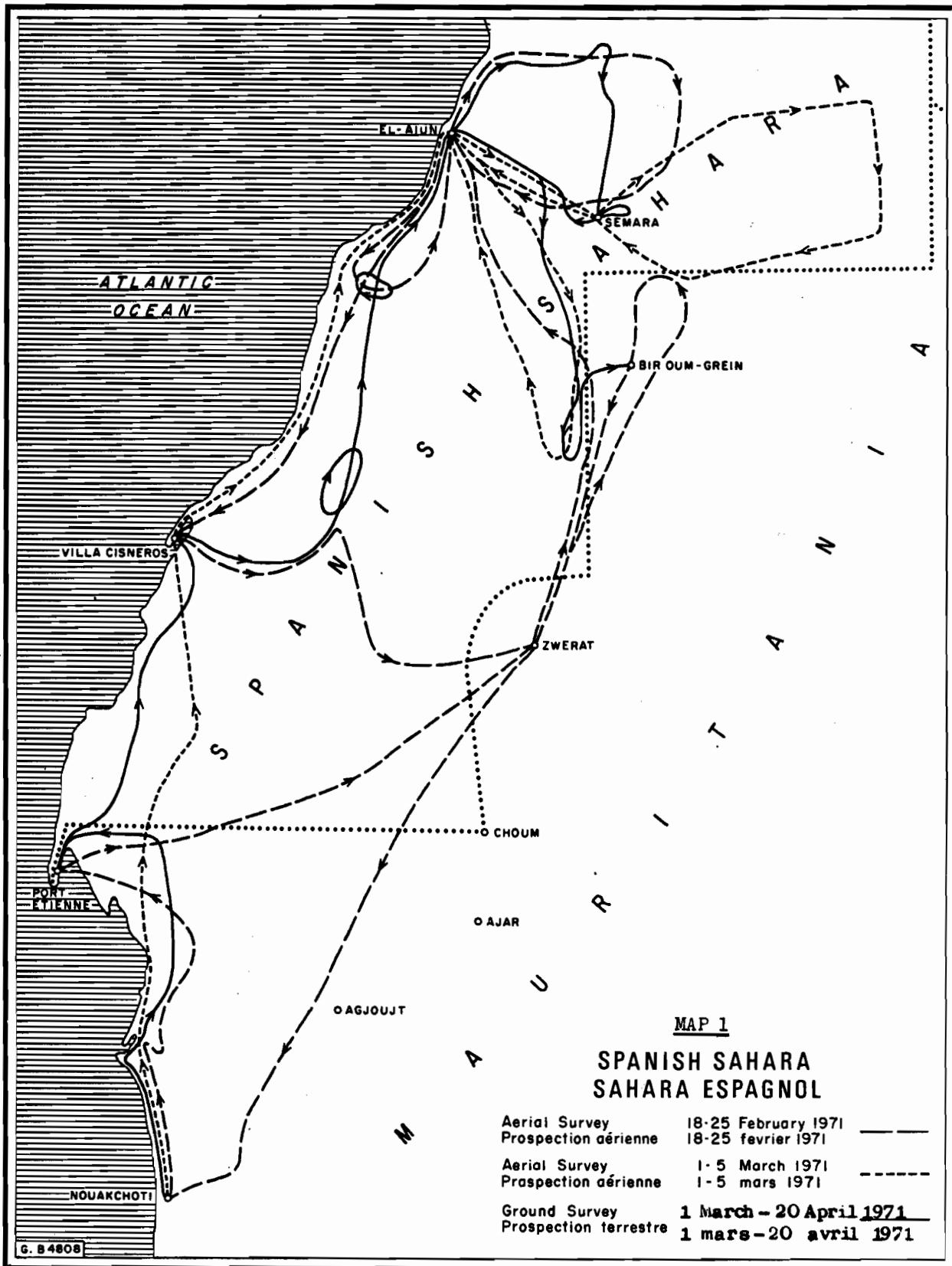
77. To finance the activities of the Commission for Controlling the Desert Locust in the Near East, the Member Governments established Trust Fund No.409 to which they pay their agreed annual contributions. The Committee noted that Trust Fund No.1 "Arabian Peninsula Desert Locust Control" which was established in 1954 for the same purpose need not be maintained separately and agreed that its balance, approximately US\$10,000 and any interest which had accrued, should be transferred to Trust Fund 409.

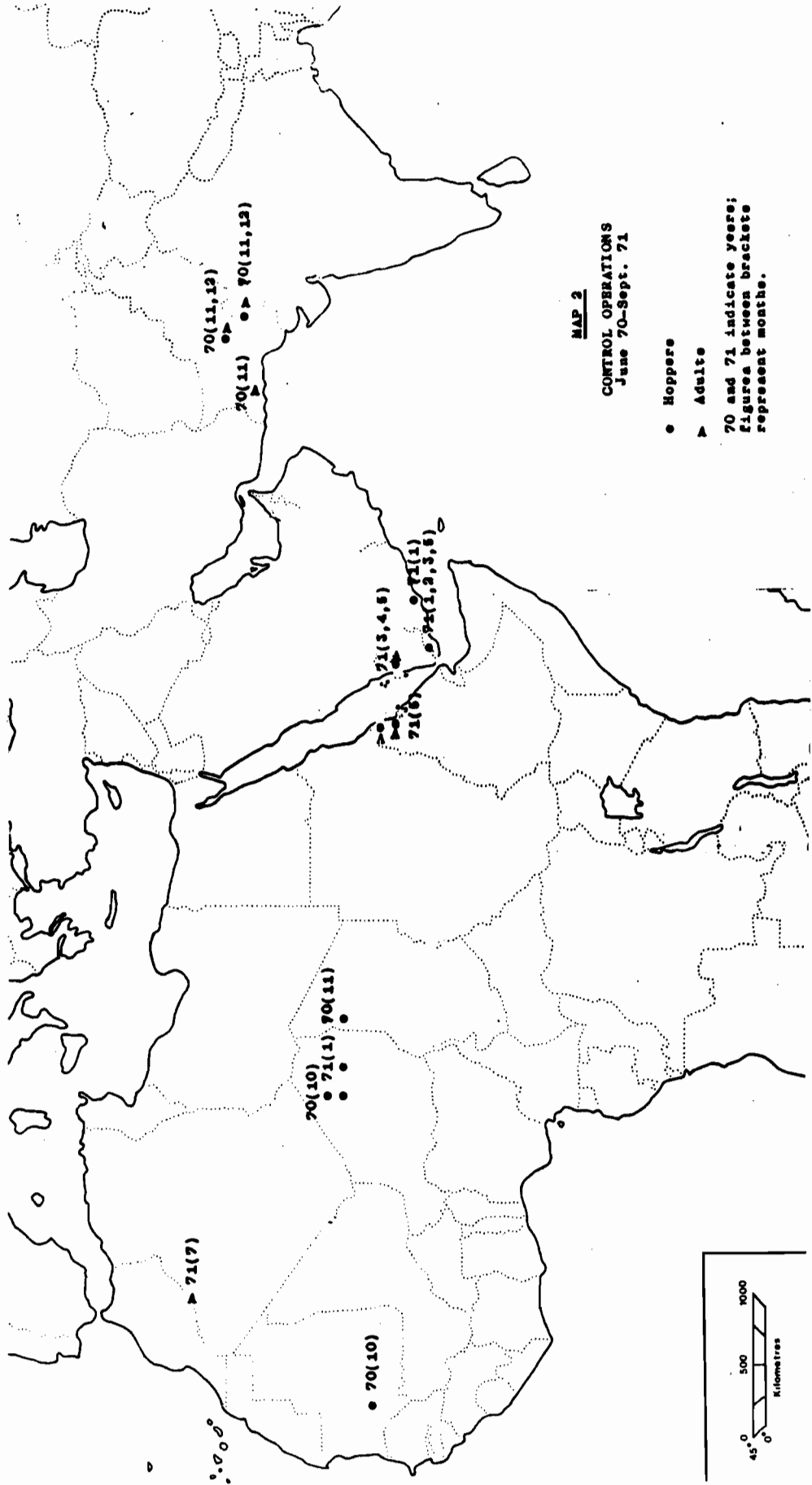
Trust Fund 90

78. Another Trust Fund 90 "Long Term Policy - Desert Locust Control" was established in 1958 and it had a balance of about US\$1,400. The Committee considered that with the establishment of Trust Fund 161, it was not necessary to maintain Trust Fund 90 and agreed that its balance along with any interest accrued should be transferred to Trust Fund 161.

DATE AND PLACE OF NEXT SESSION

79. The Committee recommended that the Director-General of FAO should convene the next Session of the Committee possibly in October 1972, to be preceded by a three-day meeting of technical experts, at a place and date to be determined by him.





APPENDIX I

ANTI-LOCUST MEASURES UNDERTAKEN BY VARIOUS COUNTRIES AND REGIONAL ORGANIZATIONS
(October 1970-August 1971)

Country	Period	Locality	Type of infestation	Area treated (sq.km.)	Insecticides used	
					Type	Quantity
INDIA	Nov.-Dec.1970	Murar & Dhanana areas of Jaisalmer district	Loose bands, 4th-5th instar hoppers, high adult populations and loose swarms		BHC	10,250 kg
					Aldrin	5 l
PAKISTAN	Nov. 1970	Mirpur, Mathelo desert near Senewari	279 groups of fresh adults	25.80	BHC 12%	272 kg
					BHC 5%	227 kg
	Nov.-Dec.1970	Sergilo, Dhami and Veryahu of Khairpur district	About 100 groups of 4th and 5th instar hoppers and 150 adult concentrations	12.90	Dieldrin 20%	1,023 l
					Aldrin 40%	555 l
					Dieldrin 20%	1,023 l
					BHC Acrodel 15%	1,023 l
					BHC dust 10%	247 kg

S O U T H W E S T A S I A

N E A R E A S T

PEOPLE'S DEM. REP. of YEMEN	Jan. 1971	Eastern coast	2nd to 5th instar hoppers	8	BHC 10%	900 kg
	Jan.-Mar.1971	Northern and western coast	4th and 5th instar hoppers	0.52 (and 1,350 bushes full of hoppers)		
YEMEN ARAB REPUBLIC	May 1971	Wadi Timmon - western coast	4th and 5th instar hoppers	0.012	BHC 10%	50 kg
	March 1971	Midi (1615N-4253E)	Adult and hopper light infestation	25	BHC dust	450 kg
	March 1971	Bakhweya (NE of Hodeidah)	Adult and hopper moderate infestation	30	BHC dust	3,000 kg

Country	Period	Locality	Type of infestation	Area treated (sq.km.)	Insecticides used	
					Type	Quantity
YEMEN ARAB REPUBLIC (cont'd)	March 1971	Zeidiah (1520N-4300E)	Adult and hopper moderate infestation	20	BHC dust	1,900 kg
	April 1971	Bakhweya	Adult and hopper dense infestation	70	BHC dust	2,350 kg
	April 1971	Zeidiah	Adult and hopper dense infestation	130	Oily Aldrin Oily Acrodel BHC dust Oily Dieldrin Oily Acrodel	22 l 90 l 3,600 kg 270 l 122 l
	May 1971	Bakhweya	Adult light infestation	4	BHC dust	400 kg
	May 1971	Zeidiah	Adult light infestation	4	BHC dust	500 kg

E A S T E R N A F R I C A

ETHIOPIA	May 1971	Northern Red Sea Coast (Wadi Cube, Wadi Aderhim, Wadi Gulbulb, Wadi Embere, Wadi Emit, Cam Ceus)	Fledglings and 5th instar hopper, isolated immature and mature, adults, incipient swarming populations	96x24 (total)	Dieldrin 10% Dieldrin 20% BHC 15% BHC 20%	4,995 l 3,735 l 4,050 l 2,802 l
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N O R T H W E S T A F R I C A

MOROCCO	July 1971	Khemlia	Adults	1.65	Bait	6,600
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W E S T A F R I C A

MALI	October 1970	North		81.70	Dieldrin 5%	6,450 l
	January 1971	East Adrar, West Tamesna (In Oumfassen, Tachagorom)	3rd to 6th instar hoppers	413.50	Dieldrin 20%	17,400 l
NIGER	November 1970			20.40	Dieldrin 5%	1,200 l
MAURITANIA	October 1970		1st to 3rd instar hoppers	0.30	Dieldrin 5%	26 l
				5.60	Dieldrin 5%	310 l

APPENDIX II

Project Budget: UNDP - Training Project in Desert Locust Control and Research.

	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>Total</u>
<u>1. Project Personnel</u>							
Experts	180,000	180,000	180,000	180,000	180,000	180,000	1,080,000
Administrative Support Personnel	40,000	40,000	43,000	43,000	46,000	46,000	258,000
	<u>220,000</u>	<u>220,000</u>	<u>223,000</u>	<u>223,000</u>	<u>226,000</u>	<u>226,000</u>	<u>1,338,000</u>
<u>2. Sub-contracts</u>							
Personal Services	20,000	20,000	22,000	22,000	22,000	22,000	128,000
<u>3. Training</u>							
a) Group Training Courses	161,000	161,000	161,000	177,100	177,100	194,800	1,032,000
b) Group Fellowships	77,000	77,000	77,000	84,700	84,700	93,200	493,600
c) i. Individual Fellowships	73,700	73,700	73,700	81,100	81,100	89,200	472,500
ii. High-level Fellowships	165,500	-	165,500	-	182,000	-	513,000
	<u>477,200</u>	<u>311,700</u>	<u>477,200</u>	<u>342,900</u>	<u>524,900</u>	<u>377,200</u>	<u>2,511,100</u>
<u>4. Equipment</u>							
Equipment and Supplies	90,000	-	-	-	-	-	90,000
<u>5. Sundry</u>							
Reporting Costs	-	-	-	-	-	5,000	5,000
Postal and Cable Charges	2,000	2,000	2,000	2,000	2,200	2,200	12,400
Contingencies	3,000	3,000	3,500	3,500	3,800	3,800	20,600
	<u>5,000</u>	<u>5,000</u>	<u>5,500</u>	<u>5,500</u>	<u>6,000</u>	<u>11,000</u>	<u>38,000</u>
Total Project Costs	812,200	556,700	727,700	593,400	778,900	636,200	4,105,100
Agency Costs (13%)	105,600	72,400	94,600	77,100	101,300	82,700	533,700
	<u>917,800</u>	<u>629,100</u>	<u>822,300</u>	<u>670,500</u>	<u>880,200</u>	<u>718,900</u>	<u>4,638,800</u>

APPENDIX III

Trust Fund No. 161 - International - Desert Locust Control

Statement of Revenue and Expenditures
Covering the Period of 1966 through 31 December 1970

	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>
	\$	\$	\$	\$	\$
<u>REVENUE</u>					
Balance brought forward at the beginning of the year	-	41,805.20	87,146.65	121,373.85	171,428.20
Contributions received (see attached list)	41,805.20	67,741.45	55,292.07	103,911.56	65,146.05
	\$ 41,805.20	109,546.65	142,438.72	225,285.41	236,574.25
<u>Deduct:</u>					
<u>EXPENDITURES</u>					
Personal services	-	-	15,295.13	25,863.41	17,252.12
Supplies	-	-	82.76	233.21	102.16
Equipment	-	-	96.54	92.75	46.71
Travel	-	-	2,486.94	11,134.97	4,246.31
Contractual services	-	20,000.00	846.55	8,086.15	567.45
Grants and subsidies	-	-	-	2,676.31	(2,676.31)
Sub Total	\$ -	20,000.00	18,807.92	48,086.80	19,538.44
Project Servicing Costs ^{a/}	-	2,400.00	2,256.95	5,770.41	2,735.38
Total Expenditure	\$ -	22,400.00	21,064.87	53,857.21	22,273.82
Balance carried forward at the end of year	\$ 41,805.00	87,146.65	121,373.85	171,428.20	214,300.43

^{a/} 12% Project Servicing Costs in 1967, 1968 and 1969
14% Project Servicing Costs in 1970

APPENDIX IV

Trust Fund No. 161 - International - Desert Locust Control

Total Contributions received from the Governments of:

						Jan-Aug.
	1966	1967	1968	1969	1970	1971
	\$	\$	\$	\$	\$	\$
Afghanistan	-	-	-	5,730.00	-	1,910.00
Algeria	-	5,160.00	1,910.00	5,160.00	2,575.94	-
Bahrain	-	-	-	720.00	720.00	-
Chad	1,836.73	-	1,778.89	-	-	3,655.42
Ethiopia	2,162.56	2,180.00	2,180.00	-	2,155.66	2,204.34
Fed. S. Arabia	1,560.00	1,556.47	-	-	-	-
France (Fr. Terr. of Afars and the Issas)	-	-	-	423.18 422.82	421.67	-
French Somaliland	-	840.00	-	-	-	-
Ghana	1,918.32	-	-	3,889.12	1,928.10	1,965.30
India	9,993.60	10,000.00	10,000.00	10,000.00	-	10,000.00
Iran	-	3,690.00	-	7,397.20	7,380.00	3,690.00
Iraq	-	2,480.00	2,480.00	4,960.00	-	2,480.00
Jordan	-	3,443.37	1,717.44	-	3,460.00	-
Kenya	1,820.73	1,800.00	-	-	3,718.72	1,781.28
Kuwait	420.00	420.00	420.00	420.00	420.00	-
Lebanon	1,360.00	1,350.00	1,350.00	-	1,350.00	1,350.00
Libyan A. Rep.	1,820.00	-	3,640.00	-	1,820.00	3,640.19
Mali	-	-	5,400.00	-	-	-
Morocco	-	5,978.00	2,990.00	-	6,020.67	2,949.33
Mauritania	-	-	3,449.68	1,695.11	1,523.53	-
Niger	1,800.00	-	1,800.00	3,592.65	-	1,809.50
Nigeria	3,632.37	-	3,650.00	7,300.00	3,650.00	-
Qatar	830.00	830.00	830.00	830.00	830.00	-
Pakistan	-	5,860.00	-	17,580.00	5,860.00	-
Saudi Arabia	1,830.00	1,830.00	-	3,660.00	-	1,830.00
Senegal	2,040.82	2,036.48	-	-	4,057.34	-
Sierra Leone	-	-	-	596.29	-	715.56
Somali Republic	1,438.87	1,450.00	1,450.00	1,449.43	1,444.80	-
Spain	-	-	-	3,596.20	2,400.00	-
Sudan	-	-	2,250.00	-	-	9,000.00
Syrian A.Rep.	-	-	-	6,030.00	-	2,010.00
Tunisia	2,001.20	1,997.13	996.06	1,986.63	1,983.65	1,995.08
Turkey	5,350.00	5,350.00	5,350.00	5,332.93	5,340.93	-
U.A.R.	-	7,840.00	-	7,840.00	-	-
Uganda	-	1,650.00	1,650.00	3,300.00	-	1,650.00
Yemen, PDR	-	-	-	-	240.00	-
Interest	-	-	-	-	5,945.04	-
Total:	\$ 41,805.20	67,741.45	55,292.07	103,911.56	65,146.05	54,636.00

APPENDIX V

INTERNATIONAL DESERT LOCUST TRUST FUND 161
PROPOSED ANNUAL BUDGET 1 JULY 1971 ONWARDS

<u>Code</u>		<u>US\$</u>
1	<u>Consultants' honoraria</u>	
	Research projects, lecturers, advisory visits, technical editors, etc.	10,000
2	<u>Expendable supplies</u>	
	Research material	4,100
3	<u>Equipment</u>	
	Research and demonstration equipment	5,000
4	<u>Travel</u>	
	Research projects, advisory visits	15,000
5	<u>Contracts</u>	
	DLIS 20,000	
	Research projects 5,000	
	Publications and miscellaneous <u>5,000</u>	30,000
6	<u>Grants and subsidies</u>	
	Fellowships/training	5,000
		<hr/>
		69,100
	Project service costs (approximate) 14%	<hr/>
		9,674
		<hr/>
		78,774
		2,142
		<hr/>
	Unallocated balance	80,916

Appendix VI

Resources Available with Various National and Regional Organisations in 1971 for Desert Locust Control

COUNTRIES	PERSONNEL		EQUIPMENT				VEHICLES		INSECTICIDES		AIRCRAFT	ANNUAL BUDGET		
	Technical staff	General staff	Power dusters	Power sprayers	Hand dust & sprayers	Exhaust sprayers	Light	Medium and Heavy	Oil c. x 00 litres	Dust M.T. M.F.			Bait M.T. M.F.	No.	Curr	x 000
NEAR EAST														
Bahrain*	3	19	8	9	35	2	4	2	-	1	-	-	ED	9
Iraq*	105	-	-	150	-	10	40	55	65	100	100	16	ID	50**
Israel	3	1	...	24	14	...	3	...	289	...	...	...	leaf	57.6
Jordan*	82	35	5	351	35	3	15	6	54	60	200	2	JD	47
Kuwait*	33	10	25	29	20	13	13	14	129	80	-	-	KD	not ltd
Lebanon*	15	37	5	16	50	-	...	...	...	20	-	1	...	...
Qatar	1	3	-	-	-	-	-	3	18	8	25	-	...	1
Saudi Arabia	16	97	56	234	125	45	343	146	2700	800	2000	-	SR	3000
P.D.R. Yemen	18	16	3	-	104	16	6	2	182	70	200	-	US \$	9.7
Syrian A.R.	120	40	150	70	-	6	90	20	600	400	300	6	...	...
Turkey	44	68	105	-	-	-	62	6	514	250	42	2	...	...
U.A.R.	70	259	13	8	97	13	32	65	514	57	42	2	...	...
Yemen	32	-	2	4	-	12	9	6	50	48	40	-	...	150
Total	542	585	372	895	480	120	617	325	4686	1859	2907	27	YR	54
EASTERN AFRICA														
Ethiopia	27	40	-	5	310	20	14	6	1620	305	-	4	ETH\$	620
Kenya	2	12	-	-	-	2	-	6	1000	-	-	-	...	...
Somali Rep.	51	29	-	51	10	12	18	6	106	10	50	-	So.Sh.	962
Sudan	174	763	250**	-	200	25	55	59	1090	2000	1000	8	Sc	300
Tanzania	4	11	2	10	2	2	4	2	40	-	-	-	...	...
Uganda	4	11	4	12	2	2	4	1	50	-	-	-	...	...
DLCO-EA	42	142	-	-	50	122	93	29	4446	31	-	8	...	320
Total	304	1008	256	78	574	185	188	103	8352	2346	1050	20	...	...
NORTH-WEST AFRICA														
Algeria	...	...	55	44	350	-	66	121	7600	2500	3300	9	DA	14600
Libya	28	4	-	9	-	50	24	5	135	28	1000	1	LC	50
Morocco	16	67	27	14	36	-	93	120	27000	1713	3500	6	DH	4775
Tunisia	65	68	110	20	250	-	26	127	100	800	100	10	DT	700
Total	109	139	192	87	536	50	209	373	34835	5041	7900	26	...	...
SOUTH-WEST ASIA														
Afghanistan	26	49	10	-	440	10	20	15	1.57	114	-	-	...	...
India	142	214	262***	-	9658	21	79	68	53514	1213	-	-	Rupee	4490
Iran	38	44	-	1010	862	50	112	20	775	48	-	30	...	...
Pakistan	140	305	-	321***	679	99	92	12	3759	262	-	10	...	...
Total	346	612	272	1331	11639	180	303	115	58049.5	1637	-	50	...	...
WEST AFRICA														
Gambia	30	-	-	4	31	-	1	1	-	-	-	-	CFA.	5000
Mauritania	15	52	-	15	70	5	9	-	-	15	-	-	Fr.M.	1756
Mali	5	-	-	-	235	-	-	-	-	19	-	-	CFA	21621
Senegal	2	6	-	3	300	10	1	22	700	500	-	-	CFA	310000
OCLALAV	28	157	-	4	-	39	71	110	10778	17	-	5	CFA	...
Total	80	215	-	26	636	54	82	133	11478	551	-	5	...	...

*Resources for pl. prot. & loc. cont. ** For loc. cont. only excl. personnel and allowances. *** For both dusting & spraying

Appendix VIa

Aircraft Available with Various National and Regional Organizations in 1971 for Desert Locust Control

Country or Organizations	PIPER			CESSNA			UTVA	BEAVER	AERO-COMMANDER (twin-engined)	HELI-COPTERS	UN-SPECIFIED	GRAND-TOTAL
	PA18	Cub	Super Cub	Cherokee 235	180/185	185/185							UT/62 06/A	Agwagon
<u>NEAR EAST</u>												
Iraq			4	4						2	6	16
Jordan		1								1		2
Lebanon			4	2						1		1
Syrian A.R.											6	6
Turkey		1	8	6							2	2
TOTAL									4	8		27
<u>EASTERN AFRICA</u>												
Ethiopia			4	2								4
Sudan			3		2	1						8
DICO-EA					2			5	1			8
TOTAL			7	2	4	1		5	1			20
<u>NORTH-WEST AFRICA</u>												
Algeria	1			1								9
Libyan A.R.		1					1				1*	1
Tunisia	5			2			3					10
TOTAL	6	1		3			4	5			1	20
<u>SOUTH-WEST ASIA</u>												
India												
Iran			27					7		3		10
Pakistan					3			10				30
TOTAL			27		3		17	17		3		50
<u>WEST AFRICA</u>												
OCLALAV	2				1							5
TOTAL	2				1							5
GRAND TOTAL	8	2	42	11	9	1	4	5	22	1	7	122

* Pilatus

Appendix VII

REPORT ON DESERT LOCUST POPULATIONS
(other than obvious swarms or bands)

Completed form to be returned to:
 1. FAO, Via delle Terme di Caracalla,
 00100 Rome, Italy.
 2. Centre for Overseas Pest Research (DLIS)
 College House, Wrights Lane,
 London, W.8. England.

Originator of Report Organization or country
 Route Period

No.	Date	Locality (lat.- long)	Hoppers or Adults	Method of Sampling				Dens. per ha	Area in ha	Colour		Hopper instar or no. of eye stripes	Habitat State of moist soil veget.	Observations on Locusts & Habitat			
				Average distance between indiv.	No. observed in traverse	Length of traverse	Foot/ vehicle no.			Average distance between clumps	Body				Hindwing		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Route - The route followed during the survey. A sketch map indicating the route and area where locusts were recorded is a most welcome addition to the report.

1. Serial number of locality.
2. Date of survey.
3. Locality to be identified by latitude and longitude, and distance and direction from a well-known point.
13. Note in particular any presence of gregarious colouration: in adults traces of pink or bright yellow and in hoppers the occurrence of black pigmentation and the change of background colour from yellow or brownish to bright yellow.
17. Type, cover and condition of growth of the vegetation.
18. a) Locusts:- Note oviposition, pairing, ovarial development, indication of grouping, number caught in light.
b) Habitat:- Is the infestation in a well defined area like a wadi or depression; are there other similar areas nearby; what is the type of terrain (plain, dunes, hillside, etc.); what is soil type (gravel, sand, loam, clay)?
c) Weather:- Note any rain, or indication of recent rain, wet and dry bulb temperature, wind strength and direction, any large rain clouds.

Appendix VIII

LIST OF DOCUMENTS

- AGP:DL/DLC/71/1 - The Desert Locust Situation (Sept. 70-July 71 incl.)
AGP:DL/DLC/71/2 - Anti-Locust Measures Undertaken by Various Countries and Regional Organizations
AGP:DL/DLC/71/3 - Progress Report of the UNDP Further Assisted Desert Locust Project (July-December 1970)
AGP:DL/DLC/71/4 - Emergency Action Undertaken in Spanish Sahara during 1971
AGP:DL/DLC/71/5 - Report of the Technical Consultation
AGP:DL/DLC/71/6 - Training Project in Desert Locust Control and Research
AGP:DL/DLC/71/7 - Status of Various Desert Locust Regional Organizations
AGP:DL/DLC/71/8 - International Desert Locust Trust Fund 161
AGP:DL/DLC/71/9 - Trial Tagging of Desert Locust in Nature with Radio-elements
AGP:DL/DLC/71/10 - Biological Research Work Under Way on Schistocerca gregaria (Forsk.) and Locusta migratoria migratorioides (Reich. and Frm.) Conducted by the Entomology Laboratory of the Faculté des Sciences d'Orsay (France)
AGP:DL/DLC/71/11 - Research on New Products and New Methods that Can Be Used in the Locust Control Campaigns
AGP:DL/DLC/71/12 - Systemic Action of an Insect Feeding Deterrent
AGP:DL/DLC/71/13 - Annual Report of the Desert Locust Information Service
AGP:DL/DLC/71/14 - Review of the Costs of the Desert Locust Information Service
AGP:DL/DLC/71/15 - Comments by OCLALAV on the Form "Report on Desert Locust Populations"
AGP:DL/DLC/71/16 - The Wind-Flow on the Red Sea Coastal Plain of Saudi Arabia
AGP:DL/DLC/71/17 - Low Aerial Photography for Desert Locust Surveying
AGP:DL/DLC/71/18 - Laboratory Investigation into Resistance to Insecticides Amongst Locusts (Restricted - Technical Consultation only).

Scale of Government Contributions for Desert Locust Trust Fund 101

	%	US\$
✓ Afghanistan	1.91	1,910
✓ Algeria	2.58	2,580
✓ Arab Republic of Egypt	3.92	3,920
✓ Bahrain	0.72	720
Cameroon	1.44	1,440
Central African Republic	1.24	1,240
✓ Chad	1.80	1,800
Dahomey	1.30	1,300
✓ Ethiopia	2.18	2,180
✓ France (French territory of Afars and Issas)	0.42	420
Gambia	1.29	1,290
✓ Ghana	1.95	1,950
Guinea	1.37	1,370
✓ India	10.00	10,000
✓ Iran	3.69	3,690
✓ Iraq	2.48	2,480
Israel	2.64	2,640
Ivory Coast	1.35	1,350
✓ Jordan	1.73	1,730
✓ Kenya	1.80	1,800
✓ Kuwait	0.42	420
✓ Lebanon	1.35	1,350
✓ Libyan Arab Republic	1.82	1,820
✓ Mali	1.80	1,800
✓ Mauritania	1.72	1,720
✓ Morocco	2.99	2,990
✓ Niger	1.80	1,800
✓ Nigeria	3.65	3,650
✓ Pakistan	5.86	5,860
Protugal (Madeira)	0.93	930
✓ Qatar	0.83	830
✓ Saudi Arabia	1.83	1,830
✓ Senegal	2.01	2,010
✓ Sierra Leone	1.51	1,510
✓ Somali Democratic Republic	1.74	1,740
✓ Spain	2.40	2,400
✓ Sudan	2.25	2,250
✓ Syrian Arab Republic	2.01	2,010
Tanzania	1.92	1,920
Togo	1.25	1,250
✓ Tunisia	1.99	1,990
✓ Turkey	5.35	5,350
✓ Uganda	1.65	1,650
Upper Volta	1.71	1,710
Yemen Arab Republic	1.84	1,840
✓ Yemen, People's Democratic Rep.	1.56	1,560
TOTALS	100.00	100,000