LOCUST and other INSECT CONTROL

in Technical Cooperation Programs in the Near East, South Asia, and Africa, 1951-57

a report of the Regional Insect Control Project

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with International Cooperation Administration

CONTENTS

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FOREWORD

In the broad field of agriculture pest control has played an important role in technical cooperation programs in the Near East, South Asia, and Africa. Beginning with locust control in 1951, there has been a continuing strong desire on the part of governments to strengthen and improve technical and organizational structures of their plant protection departments. India, Pakistan, Iran, and Iraq are now able to handle their locust problems successfully as well as to contribute to international cooperative control programs in other areas.

This report summarizes the activities and progress of Department of Agriculture entomologists working in 13 countries during the period 1951-1957. It describes the nature of the cooperative effort between the Department of Agriculture and the International Cooperation Administration, and the coordination of project activities within the host countries. Tables are presented containing data to emphasize the important material and financial participation in this program by friendly cooperative countries, and the fact that their contributions far surpass those of the United States.

The text, figures, and most of the photographs contained in this report have been taken from the monthly and annual reports submitted by W. B. Mabee and his co-workers in the field. Due credit is given them and the host country technicians for accomplishments, and for their interest and cooperation in developing and improving plant protection programs.

Sincere gratitude is extended to Mary P. Langford, Foreign Agricultural Service, who has made a substantial contribution to the preparation of this study.

The report makes available to the public a seven-year record of a small sector of technical assistance in the United States mutual security program. This record should be of interest to those concerned in this program, to personnel of the Ministries of Agriculture in the host countries, and to others interested in promoting good will, better trade and scientific relations among friendly peoples.

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Foreign Technical Programs
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LOCUST AND OTHER INSECT CONTROL IN TECHNICAL COOPERATION PROGRAMS IN THE NEAR EAST, SOUTH ASIA, AND AFRICA, 1951-1957

A Report of the Regional Insect Control Project

INTRODUCTION

The purpose of this report is to compile in one publication the facts of the direct accomplishments of the Regional Insect Control Project. In past years the activities of the program have been recorded through weekly progress reports sent to Plant Pest Control Division, Agricultural Research Service, U. S. Department of Agriculture, Washington, D. C., and also in the monthly reports that the technicians have given to the United States Operations Missions. The work of this project has been so widespread and varied that it can be only briefly summarized.

In the early phase of the project, 1951-1953, the primary objective was to introduce new control techniques (particularly air-to-ground spraying) to aid in the heroic efforts being made by the cooperating countries to bring under control a very serious infestation of the desert locust. In 1954 the scope of the project was broadened, and increasing time expended on other major pests as the cooperating countries of the Middle East assumed more responsibility for locust control. In India, Pakistan, Iran, Iraq and Jordan, the governments have carried out effective locust control programs with minimum assistance from the project. Rapidly increasing activity by the countries against other major pests is illustrated by the fact that in Iran, in 1957, the Iranian Ministry of Agriculture carried out control programs against 10 major pests on 1,800,000 acres of crops, 7,900,000 fruit and nut trees, and reared and released 80,000,000 parasites in their biological control program.

While project activity in locust control was declining in Middle East countries, the demands for assistance in country efforts against the locusts were increasing in Africa. Project technicians and planes assisted in controlling a serious outbreak of desert locust in Tunisia, and pilot-mechanic training was initiated in Ethiopia and Libya. Technical assistance was given to Morocco, first on her organization

and equipment and later on operations during a locust invasion in 1957.

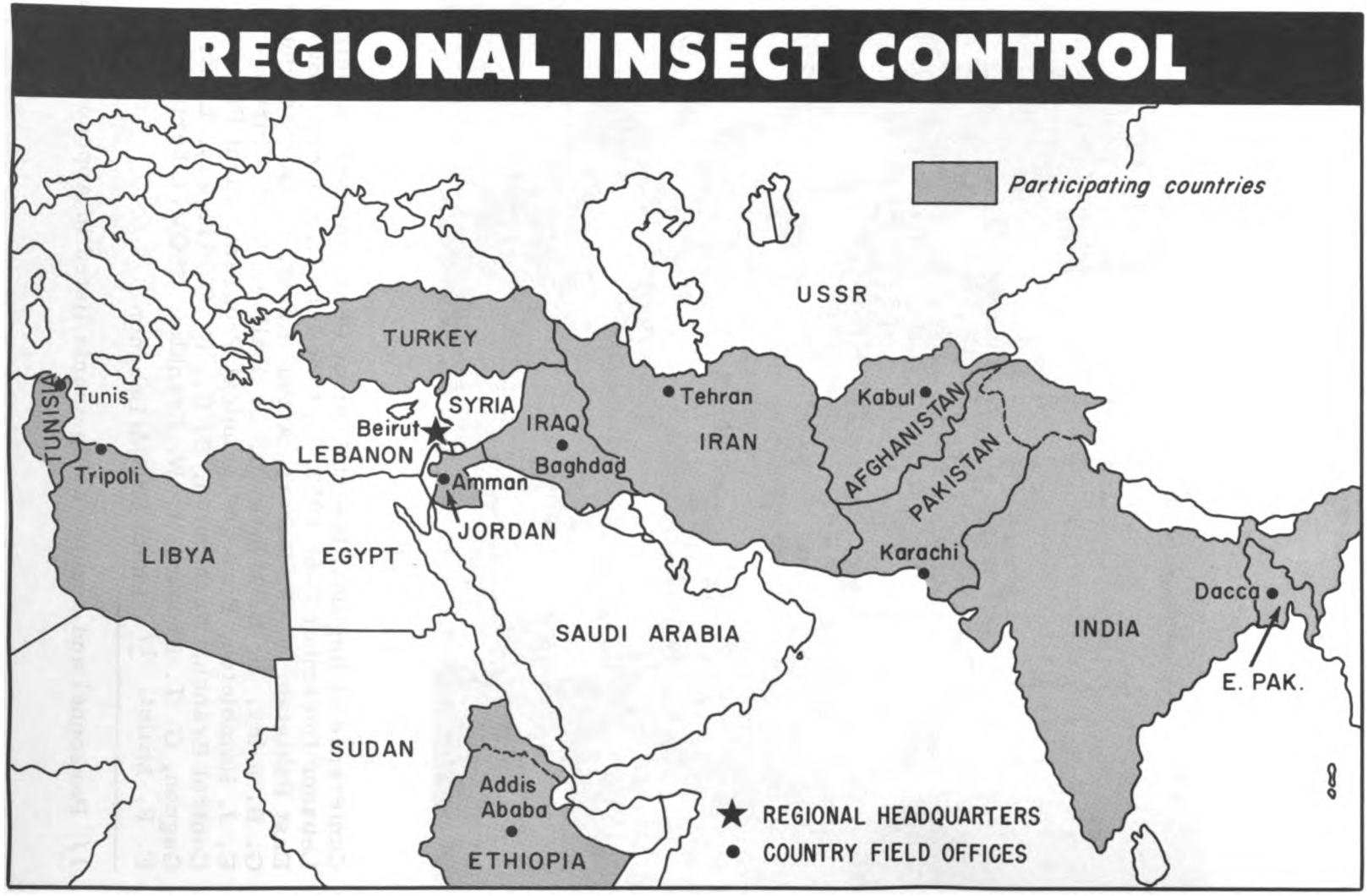
In 1957, at the request of the Baghdad Pact countries, a plant quarantine specialist was included on the regional staff. Also, at the request of Turkey, technical assistance was given in field methods in connection with their large air-spraying program and in quarantine procedures.

A significant feature of this project is the steady increase of local government financial support and the steady decrease of U. S. dollar support. The training of pilots and plant protection officials, the technical assistance on surveys, the research planning, and the encouragement given in the field of international relations have overlapped, and have had so many aspects that the statistics of our operations do not cover the extent of the project's activities. The confidence and friendship gained, and the food saved, cannot be measured in acres, tons or dollars.

We can only approximate the value of these demonstrations, contacts and friendships in the years to come. At the present time no one can tell how far-reaching will be the contacts on an international scale made by the technicians while working with the cooperating countries, nor can we anticipate the influence of the United States Information Service (USIS) and the Voice of America who have carried material on our cooperative efforts. Unquestionably, the demonstrations performed by the personnel of this project in cooperation with the technicians of the host countries have done much to develop national responsibility in plant protection, to encourage country-to-country assistance, and to develop self-confidence and pride of accomplishment within individual countries. This training will be passed on, and the effects of the work may be more clearly shown as the younger trained men advance to more influential positions in the ministries, and the farmers reap greater harvests of food crops to alleviate hunger.

Conference of Regional Insect Control Personnel held in Beirut, Lebanon December 2-6, 1957. L to R John H. Conroy, USOM/ East Pakistan; F. P. Hubert, Arthur Kaatz, R. Q. Gardenhire, G. B. Riley, W. B. Mabee, D. D. Shallow, W. C. Kurtz, E. J. Hambleton, Foreign Technical Program, Plant Pest Control Branch, Washington, D. C.; W. O. Ridgway, L. E. Gagnon, G. T. Brooks, W. W. Franklin, USOM/Liberia and E. R. Millet. 1/ Photo USOM/Lebanon

1/ Personnel and country assignments listed in Appendix, p. 1.


REGIONAL INSECT CONTROL
Participating countries
USSR
TURKEY
TUNISIA
Tunis
Tripoli
LIBYA
EGYPT
SYRIA
Beirut
LEBANON
IRAQ
Baghdad
JORDAN
Amman
Tehran
IRAN
Kabul
AFGHANISTAN
PAKISTAN
Karachi
SAUDI ARABIA
INDIA
Dacca
E. PAK.
SUDAN
Addis Ababa
ETHIOPIA
REGIONAL HEADQUARTERS
COUNTRY FIELD OFFICES

BN-6509

HISTORY

The present Regional Insect Control Project of the U. S. Department of Agriculture operates under a General Memorandum of Agreement 1/ between the U. S. Department of Agriculture and the International Cooperation Administration (ICA). Its duties and responsibilities in countries of the Near East, South Asia and Africa (NEA) are specifically set forth in a Special Project Agreement between ICA and the Agricultural Research Service of the U. S. Department of Agriculture. The Plant Pest Control Division is the implementing agency responsible for this project. 2/

Originally, this work grew out of Iran's request for aid in 1951, when Iran needed help in combating the worst locust outbreak in 80 years. A request was sent simultaneously to the United Kingdom, Russia, and the United States. At that time, the Department of State entered into a contract with a private concern to transport eight spray planes and 13 tons of insecticide to Iran for this work. The Department of Agriculture was called upon for the technical assistance. India and Pakistan hearing of the work in Iran, sent observers to see the locust control activities, and they in turn made requests to the Department of State for similar assistance. Before 1951 was over, similar contract agreements had been executed with Pakistan and India.

The total budget for these three countries in the first year amounted to approximately $500,000. It was at that time that the regional operation was agreed upon and the spray planes were purchased by the United States Government. This resulted in considerable saving, and permitted a shift of personnel and equipment from country to country.

That fall an international meeting on the problem was held in Rome at the call of the Food and Agriculture Organization (FAO) of the United Nations. It was attended by scientists from nations of the Near East, North Africa and South Asia, each presenting a report of the work in his country in this battle against the locust. This meeting created much interest. Shortly thereafter we became participants in a program of cooperative control in 1952. Since that time, this regional work has expanded into other countries of the Near East, North Africa and South Asia, and has included programs in India, Afghanistan, Lebanon, Iran, Pakistan, Iraq, Jordan, Ethiopia, Libya, Egypt, Turkey, Morocco and Tunisia.

1/ The complete project agreement is given in the appendix.

2/ A list of the personnel engaged in this work is found on page 108 of the appendix.

As the individual countries increased their organization, equipment, and ability to handle their locust problems, less and less stress was placed on locusts and more work was done on other major insect pests. This permitted staff and equipment of the Regional Insect Control Project when not engaged in locust outbreaks to work on a general control program for all harmful insects.

The objectives of the regional program have been to: (1) maintain facilities and continue needed services for a coordinated locust control program in the Near East, South Asia and Africa (NEA); (2) broaden the scope of insect control activities of the regional project to assist the United States Operation Missions in their efforts to aid the governments of cooperating countries in the development of practical control programs against other major insects, and to supervise and direct such segments of these programs as may be agreed upon; (3) aid the U. S. Operation Missions in developing a coordinated approach to the insect control programs in the various countries; (4) train nationals in insect control techniques; (5) coordinate ICA insect control activities where such activities involve cooperation with international and other organizations. Other objectives are to demonstrate new insecticides, equipment and techniques for insect control, and to train country pilots and mechanics.

The regional office works only in countries which request its assistance, and furnishes only technical assistance and limited equipment. All operating expense and ground support are furnished by the host governments. After the individual countries have developed their organizations and personnel, the objectives of the regional office are gradually to phase out of these programs. As a result, there has been considerable reduction in activities within a number of countries. All planes and personnel have been withdrawn from India, as she is handling her insect problems, using her own personnel, planes and equipment. The regional office acts in this case only in an advisory capacity.

Pakistan now has eighteen spray planes and has her own pilots and mechanics. Iran has purchased 33 spray planes, and the regional pilot and mechanic training program there has been materially reduced. Iraq has 12 spray planes and is carrying out her own program of the airplane spraying of major crops.

The regional entomologists assigned to countries work through the Food and Agriculture Officer of the U. S. Operations Mission, in close cooperation with the Food and Agriculture Organization (FAO) of the United Nations, the Ministries of Agriculture, and with other organizations engaged in locust and insect control. The United States has led in air-spraying phases of the work.

INTERNATIONAL ASPECTS

The large area over which the desert locust migrates, recognizing no national boundaries, has pressed home the need for international cooperation. Following the general heavy locust infestation in the Near East, the success of the United States air-spraying program in Iran, Pakistan and India in 1951, created increased interest in the overall locust problem. The Food and Agriculture Organization (FAO) of the United Nations, realizing the need for stronger coordinated organization between the countries, called a conference on locust control in Rome in October 1951, which was stimulated to a large extent by the initial work conducted by the United States in these three countries.

The Conference agreed on a Technical Advisory Committee to counsel FAO in technical matters on locust control. This committee was composed of a technical representative of each of the following countries: United Kingdom, United States, Egypt, France, India, Iran and Pakistan. The United States through the Agricultural Research Service, USDA, and the Agricultural Programs Division, ICA, has been particularly active in assuming its responsibility in this and other committees in connection with the overall locust control problems.

Terms of reference were established and the Conference started listing the requirements of insecticides, equipment, and personnel necessary for control over the entire area affected by locusts for 1952. The pooling of equipment and materials were also discussed. Interest and attention were directed solely on requirements to do the job.

The Technical Advisory Committee has been meeting once or twice each year to appraise the locust situation, discuss strategy, indicate priority of infested areas, and advise on the FAO policy. At the meeting in Rome in March, 1952, FAO announced it had secured permission to use $500,000 of unexpended technical assistance funds. This amount was provided for the 1952-1953 campaigns for the purchase of trucks, sprayers, aircraft and insecticides to member nations in the threatened areas.

FAO's role in international locust control has been effective in bringing all interested countries together for joint acceptance of a continued international campaign against the desert locust. In addition to the Technical Advisory Committee various other committees have been convened by FAO since 1952. These have special functions of coordination and administration in connection with emergency campaigns of locust control. Twenty or more countries in the Near East, South Asia and Africa, each with its own locust control organization,

FAO Technical Advisory Committee on Desert Locust Control, Tangier, Morocco, June 1957. Partial view of delegates include (left to right) Mohamed Hussein, Agricultural Adviser, Arab League, Egypt (observer); K. B. Lal, Plant Protection Adviser to Government of India and Director, Locust Control, Ministry Food and Agriculture, India; Esfandiar Esfandiari, Administrator General of Plant Protection, Ministry of Agriculture, Iran; Habibollah Nasser, Chief, Locust Control Service, Ministry of Agriculture, Iran. Photo USOM/Morocco

work independently or collectively on locust control. The bulk of actual locust control is conducted by the governments of these countries at their own expense and without outside aid. Approximately $12,000,000 is expended annually by all these governments for locust

control. FAO has contributed a great deal to the success of locust control in recent years, although its objectives and nature of operation are not entirely comparable to those of the United States in its bilateral technical assistance program.

At the First Technical Advisory Committee meeting in Rome in 1952, the United States position was again emphasized as one that worked through bilateral agreements with individual countries without jeopardizing individual national responsibilities. The position of the United States has remained unchanged and its work has continued at approximately the same level, conditional on the limits of annual appropriations and agreements with individual countries.

The United States program on locust control is operated by the Agricultural Research Service of the United States Department of Agriculture in cooperation with the International Cooperation Administration. Its purpose is to demonstrate and train; to demonstrate modern equipment including use of aircraft, insecticides and techniques; to train local pilots, mechanics and locust control officers and to fit these activities in with the work of other countries and organizations interested in the control of the desert locust, Moroccan locust, senn pest and other major insects of economic importance.

During the period over the last seven years in which the United States has had an opportunity to participate in and observe locust control activities in the Near East, South Asia and Africa, most substantial progress on the part of the countries of the Region has been noted. There has developed within these countries effective control organizations, the utilization of new techniques and insecticides, and a fine spirit of international cooperation. FAO has contributed to the effectiveness of control activities by providing facilities for coordinating the operations of the countries of the Region, by assisting the countries in the development of their own control organization, and by providing technical assistance to control operations in the Region.

International cooperation has played a decisive role in materially reducing locust infestations and losses. Country to country cooperation and assistance by FAO and other interested agencies have contributed greatly to effective economic control of the desert locust in the Near East. Continued joint effort of all countries concerned should be encouraged so that there will be no diminution of competence and facilities that the several countries of the Region have built. The

A village boy looks up at the sound of a U. S. spray plane as it flies overhead during a locust control campaign.
Photo USOM/Pakistan

destructive potentials of the desert locust should be kept in mind and cooperative activities so organized as to maintain economic control of this pest, thus assuring there will not be major infestation problems in future years.

To achieve our objective in international locust control we feel that the key factor is the continued development and maintenance of strong competent control organizations in each of the countries of the region. We believe that this responsibility for control operations is best placed where the problem of infestation is keenly felt, namely in the countries themselves. We know that the countries feel this responsibility and want to assume it. This they have amply demonstrated. Furthermore, financial assistance by the FAO was only initiated on an emergency basis in order to carry a part of the burden while countries were preparing to assume their normal responsibilities.

We believe, therefore, that the major efforts of FAO, ICA, and other interested agencies should be directed toward aiding and encouraging the countries of the Region in their efforts to assume responsibilities, cope with infestation problems within their borders, and in cooperation with neighboring countries as situations may warrant. Thus, the greatest need is to secure greater accomplishment with the organizations, appropriations, personnel, equipment and materials available; secure a wider application of practices already known, and obtain a more efficient use of equipment by faster movement. Another great need is a more complete collection and faster dissemination of locust information to those engaged in locust control.

The United States government has been interested in the developments that have been made in the control of the desert locust. The United States has been pleased to have been able to assist in these developments through cooperation with the countries that are affected by the pest, through our participation in FAO and through participation in the work of committees. Probably the greatest advances that have come from these meetings are:

1. The consciousness of the need for international action on common problems.

2. The certainty of the advantages of mutual aid from country to country, which has been so amply demonstrated in locust control.

3. The demonstrated need and ability to "give and take" in working together as an international group.

4. The development of self-confidence, not only in meetings, but in actual control activities.

5. The individual national pride of accomplishment in each country's own campaigns.

6. The gains of all by the exchange of information and the development of advanced techniques.

REGIONAL PLANT QUARANTINE

The plant quarantine situation in the Southwest Asia and African area is complex in that it involves extreme variations ranging from (1) countries lacking any plant quarantines to those fully established with laws and complete activities; (2) extensive interchange of imports and exports of agricultural crops both within the above area and outside thereof, including the United States of America; (3) the very real danger of the introduction and establishment of serious plant pests and diseases, not only from known centers of infestation within the area, but also from foreign areas, by improved and rapid transportation; (4) the difficulty of some area countries in meeting the foreign phytosanitary requirements in regard to their exports of agricultural crops; and (5) the awareness of the area countries of the above situation and inherent dangers and their genuine desire for both protection and improvement through realistic legislation, necessary training of personnel, improved organization and methods, and establishment of facilities for effective plant quarantine activities, all of which should be secured through competent technical aid and advice.

Work progressed in the interconnected plant quarantine fields of basic legislation, quarantines and orders; organization and planning; areas of enforcement; methods of inspection, treatment and certification when necessary, of imports and exports of quarantine interest; relations with the public, including private companies and governmental agencies--domestic and foreign; insect pest and plant disease surveys; and selective publicity in 1957. The objectives in these fields of plant quarantine activities have been accomplished in part by means of and through consultations, "on-the-job" training, dissemination of a wide variety of informative literature and technical data, demonstrations, and direct communications. In addition the program has provided the basis for efficient, interrelated and "biologically sound" legislation and protection against possible dangerous insect pest invasions and serious plant disease epidemics by introductions from foreign areas without undue restraint of international commerce.

During the calendar year 1957 the regional plant quarantine specialist worked in the Southwest Asian and African countries of Afghanistan, Ethiopia, Iraq, Iran, Lebanon, Pakistan and Turkey. One or more assignments within these countries resulted in his travels at various intervals an estimated 22,891 miles by autobus, airplanes, spray planes, boats, jeeps and trains for approximately three months.

BN 5599

This scene was photographed at a part of the training course at Baghdad and shows Iraqi plant quarantine officers examining fruits and vegetables for insect pests and plant diseases. The produce loaded trucks in the background have entered Iraq and await fumigation. The trucks came from Jordan, Lebanon and Egypt.

View of 12 Iraqi plant quarantine officers in Iraq customs station at Baghdad, Iraq receiving baggage inspection training as part of "Plant Quarantine Short Course" held in Iraq from October 21 through November 2, 1957 by Regional Insect Control Project and Iraq Ministry of Agriculture. Photo USOM/Iraq

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Special surveys were made during the year of fields of activities, including those of quarantine interest for both the Kingdom of Afghanistan and the Empire of Ethiopia, in view of the fact that these countries presently lack established plant quarantine activities. However, in view of the proposed establishment of quarantines, data was collected for the reports on imports and exports of plant quarantine interest, the necessity of securing and training qualified personnel, the need for economic insect pest and plant disease surveys, kinds and yields of main crops, and the geography and transportation systems of the countries for the purposes of locating inspection stations at key border, seaport and airport traffic points.

Preliminary surveys were made during 1957, of established plant quarantine activities in the Republics of Lebanon, Pakistan and Turkey and in the Kingdoms of Iraq and Iran. Reports on the above surveys were completed for Iraq, Pakistan and Turkey and are pending for Lebanon and Iran. The preliminary reports on the surveys contain (1) analyses of the basic plant protection laws and quarantines, (2) an evaluation of current inspection procedures and treatment methods including facilities, (3) the status of insect pest and plant disease surveys, (4) observations on current enforcement of plant quarantines and of quarantine personnel, (5) data on imports and exports of quarantine interest, and (6) recommendations for improvements in the above fields of activities.

At the request of the Ministry of Agriculture of the Empire of Ethiopia, a basic plant protection law--"The Insect Pest and Plant Disease Act of Ethiopia"--was written for consideration and approval of the Council of Ministers. "Plant Quarantine Import Regulations of Ethiopia" was also drafted on the legal basis of authority contained in the basic Act. Both documents are under consideration and awaiting final revision before adoption.

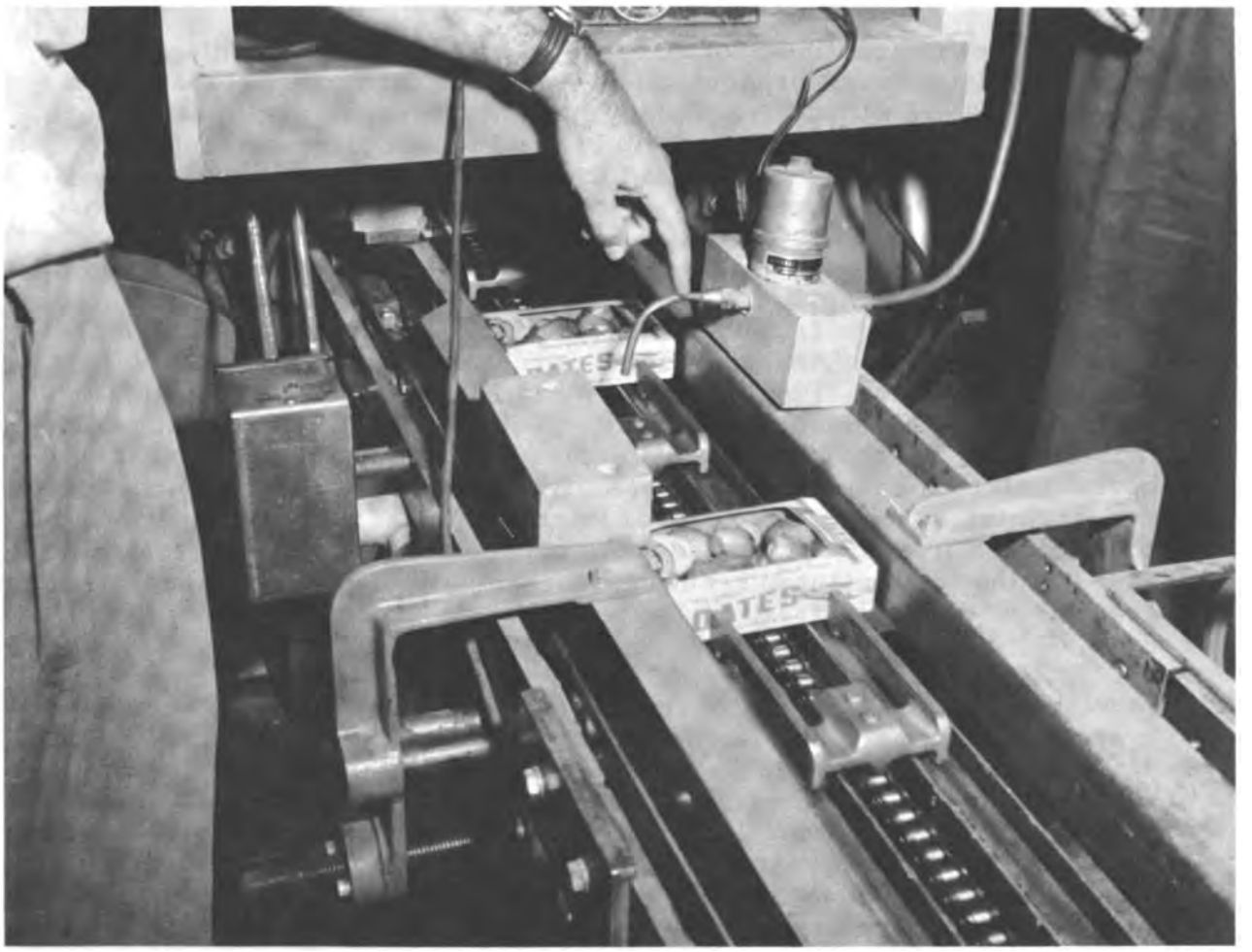
As the result of a similar request by the Ministry of Agriculture of the Kingdom of Afghanistan a basic plant protection law--"The Insect Pest and Plant Disease Act of Afghanistan"--was also drafted for consideration. The proposed Act was followed by drafts of "Plant Quarantine Import Regulations" and "Plant Quarantine Export Regulations" which were transmitted to Afghanistan for consideration and approval by the Council of Ministers at Kabul.

In order to facilitate insect pest and plant disease surveys in various Southwest Asian countries, arrangements were made to supply each Regional Insect Control Project entomologist with standardized identification forms, and, as needed, other supplies necessary for

This truckload of produce is shown inside the Baghdad fumigation plant. This atmospheric fumigating chamber was built in 1956. The Iraq Plant Protection Division carries on the fumigation program.

BN 5602

Instruction is given at Iraq Plant Quarantine Short Course by Regional Insect Control Project entomologist W. O. Ridgway, and plant quarantine specialist, Frederic P. Hubert, on procedure for operation of drum type atmospheric fumigating chamber with methyl bromide gas. Except for the dispenser this chamber now in use was entirely constructed by Iraqi technicians.



This is a close view of modern machinery for treatment at Basrah on the Persian Gulf in the Iraq Date Association plant where packages of processed dates are given a final precautionary injection of ethylene oxide (liquid) to kill any stored products larvae that may have escaped previous vacuum fumigation.

proper shipment of specimens for identification to the States. Wherever necessary, the need for economic insect pest and plant disease surveys was stressed, not only verbally in Ministry conferences, but also in plant quarantine reports. As opportunity offered on field trips, collections were made of insect pests and plant diseases which will be included in the separate annual reports of the respective Regional Insect Control Project entomologists.

The first Plant Quarantine Short Course to be held in the Middle East was given in Baghdad, Khanaquin, and Basra, Iraq, from October 21 to November 2, 1957 with 11 Iraqi plant quarantine inspectors in attendance. The course was under the leadership of the Project plant quarantine specialist and entomologist assigned to Iraq. Almost equal time was given to classroom lectures and "on-the-job" training including demonstrations of various types of fumigation and inspection procedures at both border stations and at seaports. Excellent cooperation was given by the Iraqi Ministry of Agriculture in furnishing financial support and also in providing part of the faculty for the school. More than one-half of the lectures were given in Arabic by Iraqi Directors of the Divisions of Entomology Research, Plant Pathology and Plant Protection. A highlight of the school was the mutual cooperation with the Iraqi Customs in which a representative of the customs and excise lectured at the plant quarantine school. Later an illustrated talk was given at the Iraq customs and excise training school. The general interest, the active participation of the trainees in discussion, and their presentation of a list of desirable changes in the Iraqi plant quarantines, organization, methods, and operations were highly gratifying aspects of this successful short course.

It is well to report at the end of the first year during which the services of a plant quarantine specialist were available in the Southwest Asia and Africa area that the requests for aid and advice in the many phases of plant quarantine activities were much greater than anticipated either in Beirut or in Washington. A backlog of planned work projects has accumulated during the year. If the number of requests for advice and services in plant quarantine activities increase during the next year in this very extensive area, it may be necessary to limit the scope of activities or concentrate attention on specific countries.

IRAN -- Areas of Major Project Assistance, 1951-1957

When the hordes of locusts flew into Iran in 1951, Iran appealed to the United States for aid. The resulting program marked the beginning of the Regional Locust Control Program in the Middle East. The Regional Insect Control Project covering work on major insect pests in countries in Near East, South Asia and Africa followed.

▲ Locusts ● Other Insects

Sprayplanes were unloaded from the transport planes in Abadan for immediate use in the original campaign in southwestern Iran.
Photo USOM/Iran

IRAN

Assistance with insect control in Iran has accomplished much since 1951, when the United States was first requested to help with a serious infestation of the desert locust. The control of insects on economically important crops has increased the agricultural potential and will continue to increase it through continued assistance and Iranian effort.

Estimates indicate that approximately $1,000,000 of United States aid to Iran has been expended since 1951 on locust and other insect control in Iran. It is estimated that over 1,250,000 acres of crop and range land have been protected from insect attack during this period. Therefore, it has cost the United States about 80 cents per acre to help and to teach Iranians to control insects over the initial four-year period.

An adult desert locust, Schistocerca gregaria is shown above.

The plane itself looks like a huge bug as it delivers its lethal dose to locusts.
Photo USOM/Iran

In addition to the immediate effect that insect control has had on the economy of Iran, the locust control program had a most favorable influence on the Iranian people. It was one of the earliest Point IV programs and the people could at once see the advantage of killing locusts that were ruining the crops upon which their livelihood depended.

The control of insects other than locusts also had an impact on the Iranian farmer. Hundreds of demonstrations have shown him the effectiveness of small relatively inexpensive dosages of insecticide. By contrasting the treated with the untreated areas he has seen what insect control could mean. It has meant the difference between going hungry and having a full stomach. The farmer has learned that Allah does not do everything alone. The farmer sees he must use a little initiative and that Allah will help.

To the newcomer, inexperienced in Eastern ways, the insect problem seems simple enough. It seems only necessary to spray the insect with the recommended insecticide. However, even though we realize that the insect problem in the East is different from a technical point of view, there remains the psychological problem to overcome and in addition, there are political problems which fall into what may be called "political entomology."

Emphasis has been placed on an expanded control program through support of the newly organized extension program and training of extension pest control specialists. Much of the effectiveness of the agricultural program in Iran depends upon a good extension program. Certainly the present success of the insect pest control program is largely due to the Extension Service. Much attention is given to the training of technical personnel in research and control. This is a recognized factor in the development of the country.

Since insect control assistance by the United States first was undertaken in Iran, certain tangible advances have been made. Iranian Air Force pilots, mechanics and ministry technicians have been given field training and additional courses throughout the year when not engaged in control programs. Thirty-eight pilots were trained in low-level flying and techniques of applying insecticides. Thirty-one mechanics received training in the repair and maintenance of airplanes used in spraying operations. A dozen technicians were trained as spray unit supervisors.

Results of airspraying are shown above.

With an expanded locust control program in the Ministry, additional personnel had to be trained in the techniques of aerial control supervision. Various courses were given to fill this need. The Ministry of Agriculture set up its own aerial unit and arranged for an airfield and construction of hangars, machine shops and other facilities. Approximately 30 airplanes have been purchased,with orders placed for six more. By 1955, Iran had built up its own force of planes, pilots and mechanics to the extent that the only assistance given on the locust program thereafter was on the Moroccan locust , a different species from the more common "desert locust."

Regional entomologists attached to the program in Iran have been instrumental in selecting and giving guidance to ten trainees sent to the United States for training in entomology and plant quarantine work.

From 1951 through 1955, 143,000 acres of crop and rangeland were sprayed by United States and Iranian planes under the supervision of United States entomologists. Since 1954 most of our efforts on locust control have been directed at supervision of the Iranian planes and personnel.

There was no desert locust infestation in Iran in 1956, though a serious outbreak of the Moroccan locust occurred in northeastern Iran which threatened extensive crop damage. Control measures were applied by the Ministry of Agriculture with some help from the Regional Insect Control Project. Eight Ministry of Agriculture planes were used to apply aldrin to approximately 52,000 hectares of rangeland and about 100,000 hectares were handbaited using BHC and wheat bran.

The Regional Insect Control Project is supporting the Ministry of Agriculture in its plant protection program in an advisory capacity and in assisting in conducting tests with various insecticides for the control of specific insects. It will continue to work toward finding more effective and economical control measures in cooperation with the Ministry. Phasing out activities with desert locust and spiny bollworm control have been completed.

According to conservative estimates crop damage due to insects in Iran amounts to approximately $70,000,000 annually. Damage to grain crops amounts to $12,000,000, fruits $13,000,000, pistachios $10,000,000, and other damage $35,000,000.

Field tests of various chemicals made in cooperation with the Ministry of Agriculture for the control of the major insect pests have been important activities of the program in Iran. The work on biological control has been strengthened and expanded in recent years with the completion of a parasite laboratory and greenhouse at Isfahan. The principal activity of this laboratory is the rearing of parasites for the control of the senn pest of cereal crops. Research on insects and plant diseases will be carried on by the Iranian government at this laboratory, now considered the best equipped and staffed outside those of Tehran and Karaj. The laboratory will also serve as a training center for college graduates in the field of plant protection.

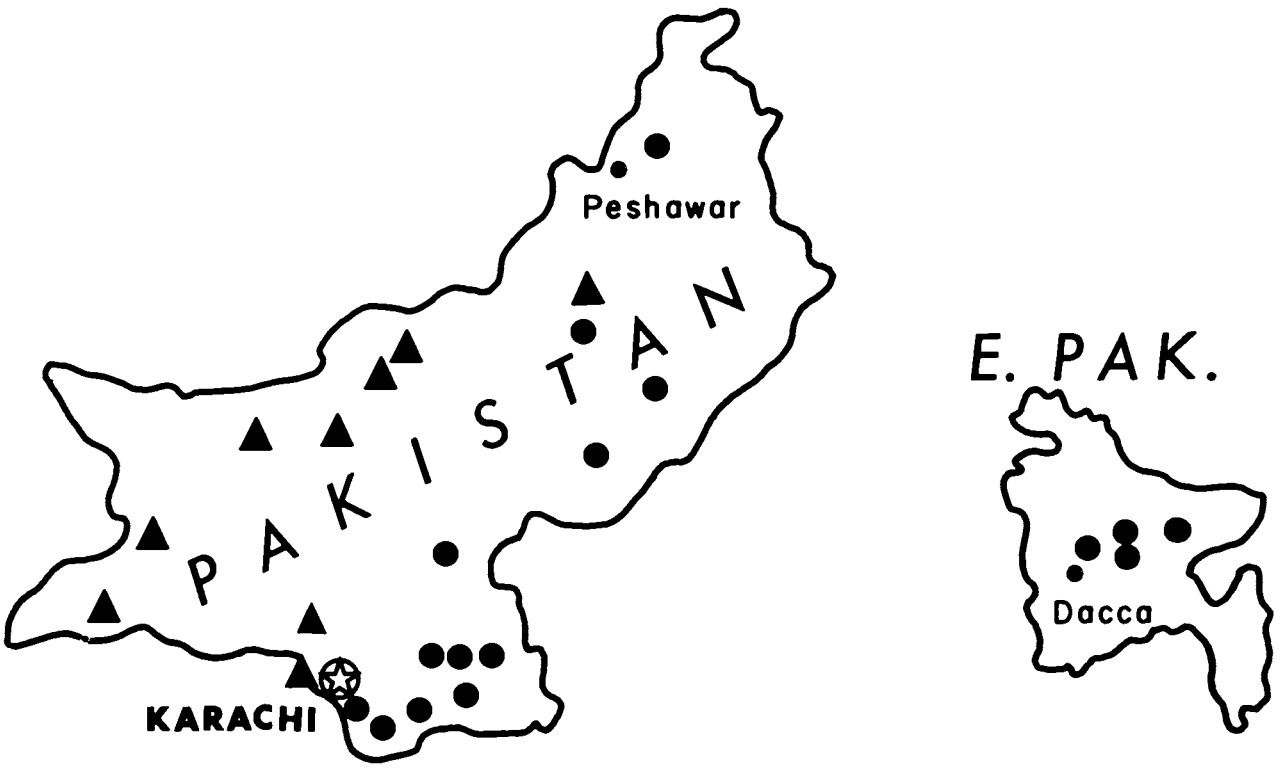
Through continued progress in the field of plant protection, emphasis is now placed on the development of research and educational facilities at the Karaj Agricultural College. A typical example of this progress is reduction of damage caused by the senn pest to wheat and barley. Only 7,500 acres of these crops were treated in 1956, while some 50,000 acres were treated in previous years.

The aerial spraying of breeding grounds with aldrin, a powerful insecticide, is supplemented by hand-spreading of poisoned bait. Photo by USOM/Iran

During 1957 entomological advisory services were extended not only on a National level, but to each of the ten provinces of Iran. With the principal exception of locusts and senn pest operations, most of the control programs in which the Ministry of Agriculture participated were of a demonstrational nature, against a quarantined pest such as black scale on olive, or a control program in which the landlord paid for the cost of materials and labor.

Although finances were provided in 1957 from the Iran-American Joint Fund for employing civilian pilot-mechanics, the aerial control unit continued to be staffed by Air Force personnel. However, His Imperial Majesty the Shah has agreed to the transfer of Air Force pilots to civilian status and money is available for the Ministry to construct its own hangars and shops. Sizable acreages were treated by aircraft during the year.

Demonstrations of chemical control measures and field tests for better chemical control were principally directed toward alfalfa weevil, senn pest, sugarbeet insects, and the application of dormant sprays to deciduous fruit trees.



BN-6512

PAKISTAN--Areas of Major Project Assistance, 1951-1957

As the map shows, Pakistan has two separated and distinct units. The army worm infestation in the rice crop so damaged it that it caused the Pakistan Government to take a new look at its pest control program. During 1956 the locusts were the most important economic pest in the country.

▲ Locusts ● Other Insects

U. S. entomologist W. B. Mabee and Pakistani entomologists Miss Hussain and Mumtaz Khan observe results of locust control on the desert.
Photo USOM/Pakistan

471778 O - 58 - 3

PAKISTAN

As the map shows, Pakistan has two separated and distinct units, dissimilar in most respects, except religion. West Pakistan is arid, while the rainfall is very heavy in parts of East Pakistan. The primary crops of West Pakistan are cotton and wheat, while in East Pakistan they are rice, jute and tea.

Locusts were cleared in Pakistan in the spring of 1955, and did not create a problem in 1956. Unless flights come in from the Arabian Peninsula no difficulty is expected in 1958.

Mango leafhoppers are shown at work on these leaves.
Photo by USOM/Pakistan

Taskhir Ahmad, Director of the Department of Plant Protection of the Pakistan Government, and Pilot David Bump, vice-president of Aviation International Delivery Service, are shown in the cockpit of one of the three AIDS planes in Pakistan, which were used for airspraying locust-infested areas under the Technical Cooperation Program.
Photo by USOM/Pakistan

The problem of killing fish in the paddy fields of East Pakistan with the insecticides used for the control of stem borer in rice was a difficult one in 1955. An attempt to find a feasible control method which would not endanger the fish was continued.

In 1955 insecticides were demonstrated on paddy stem borer in rice; leafhoppers and blackflies on mangoes; jassids and whiteflies on cotton; pyrilla and stem borer on sugarcane; and pumpkin beetle on squash.

The use of insecticides was demonstrated on pyrilla on sugarcane. Note heavy infestation on foliage.
Photo by USOM/Pakistan

The 1956 program included work on blackfly of citrus; almond scale, peach stem borer; red spider and blight on tea; and smut diseases of cereals.

The photograph shows a Pakistani loading water from the river. This water is packed by camel to a camp in the desert where it is used to dilute the powerful insecticide, aldrin, which is sprayed by planes to kill locusts. Photo by USOM/Pakistan

In 1956, the Ministry of Agriculture appropriated about $250,000 for insecticides for the control of cotton pests.

Personnel wise in 1955 the Department of Plant Protection was greatly expanded when fourteen offices were set up. The employees to man these offices were given special courses in three training schools in Karachi. A branch of the Plant Protection Department was started in Dacca, East Pakistan.

The mango branches on the left were sprayed, those on the right were unsprayed. Photo by USOM/Pakistan

Village children examine dead locusts in the desert area of Pakistan. They are at the scene of locust spraying operations. Photo by USOM/Pakistan

During June and July, 1955, a survey was made for barberry bushes through Punjab and the Northwest Frontier Provinces. Two species of barberry were found heavily infected with black stem rust which attacks wheat. In this province over a thousand gallons of insecticide endrin were purchased for use against the sugarcane pyrilla. About a thousand bucket pump sprayers were also purchased for the farmers of that area. A special tax was levied on farm land in the NWFP to finance pest control operations to be carried on by the Provincial government.

In September, 1955, spiny bollworm caused heavy damage to cotton bolls at Multan in the Punjab. The Department of Plant Protection sent rotary dusters and several tons of insecticide. Pesticides also were supplied by the Punjab Department of Agriculture. Wheat seed treated on a demonstration basis for disease control, showed such good results that 30,000 pounds of seed were treated in the Punjab alone in 1956.

A general insect survey was made in East Pakistan in 1955. The more important insects observed were jute moths moving from jute to rice, plant bugs that cause blight to tea leaves, sugarcane borers and the pyrilla of sugarcane. The Gopalpur sugar mills applied for an import license for insecticides for use against these sugarcane pests on 38,000 acres.

A mango grower in Malir, whose grove was badly infested with leafhoppers, sold the grove for 600/-/- rupees. In 1955, it was selected as a demonstration area. After the leafhoppers were controlled, the grove sold for 15,000/-/- rupees.*

Other establishments applying for import licenses were the Pakistan Tobacco Company and the Pakistan Tea Association. In the Rahimyarkhan, cotton farmers purchased their own insecticides and aircraft in 1956.

The army worm infestation in the rice crop in East Pakistan in November 1955 so extensively damaged it that it caused Pakistan Government to take a new look at its pest control program. Accordingly, 6,000,000 rupees were appropriated for chemicals, equipment, and new personnel. An additional 6,000,000 Rs. were appropriated for the first six months of 1957. The West Pakistan Government also appropriated 2,000,000 Rs. for additional personnel.

During 1956 grasshoppers were the most important economic pests in Pakistan. The first generation caused extensive damage to crops such as young cotton, rice, vegetables and burseem. Heavy summer rains

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* 1 rupee equals $0.21.

Pakistani mango growers are shown spraying the trees for control of leafhoppers. Photo by USOM/Pakistan

produced lush vegetation throughout most of the desert and crop land areas. Therefore, ample food was available so little damage from the second generation occurred. However, by the time the third generation appeared most of the grasses on the desert had dried and the grasshoppers began moving into the young wheat plantings. Extensive damage occurred throughout the Indus River plain and in the mountain valleys of Baluchistan.

Late in the fall armyworms and leafhoppers again threatened the rice crop in East Pakistan. Timely control measures held the damage to a minimum and a bumper rice crop was harvested.

In addition, the Government of Pakistan sprayed and dusted 110,000 acres for cotton insect control and treated 10 percent of the wheat seed planted in the fall of 1956.

Project materials supplied by the USOM were used to carry out demonstrations for the control of insects which cause damage to orchards, vegetables, sugarcane and jute. A total of 27 demonstrations were made in 1956.

Locusts were generally minor in importance. Yellow swarms were located at Dera Ismail Khan, Quetta and Kalat. A grey swarm was reported from Bahawalpur. Scattered yellow locusts in low populations were general throughout the Sind and Bahawalpur deserts extending into India.

It is felt that increased training facilities should be established in Pakistan to give general plant protection training to local personnel, but that training outside Pakistan should be given when specialization is required.

The Government of Pakistan implemented its new policy of plant protection in 1957. Under this policy, the Governments of East Pakistan and West Pakistan are responsible for all plant protection ground operations within their territories and the Central Government retains responsibility for plant quarantine, locust control, aerial operations, and research. The Government of East Pakistan elected not to assume its responsibilities until 1959 or 1960. The Government of West Pakistan took over its ground operations immediately.

Two demonstrations were executed in West Pakistan in 1957 which are noteworthy, as they were perhaps the first attempt to translate plant protection into a well-rounded extension program. The first was a demonstration extension program to control the rice stem borer on 8,000 acres of rice nursery stock. The first phase was an educational program whereby the cultivators were made aware of the pest, its life cycle, nature of damage, and proposed control operations. The response and participation of the villagers of all levels were excellent. The control operations resulted in approximately 31,000 acres of paddy free of rice stem borer damage. Increase in yield was estimated to be over 50 percent. A similar program is presently underway for the control of rats covering 200,000 acres.

In East Pakistan beginning in 1957, greater support was given to the program. The area is essentially a large delta region, traversed by many rivers and streams. The Government of Pakistan is attempting to strengthen the plant protection progrem in East Pakistan so that in 1960, when work is turned over to the Government of East Pakistan, a reasonably capable and experienced staff and organization will be functioning.

Aerial operation under the Central Government of Pakistan has made noteworthy strides. The aerial wing and its operations were completely reorganized by the Government of Pakistan. The three planes for East Pakistan are now in operation. Actual control operations in 1957 covered approximately 150,000 acres.

BN-6514

INDIA--Area of Major Project Assistance, 1951-1954

India in July 1951 had an operation base for locust control set up at Bikaner, India. Airspraying was directed at swarms, but this practice was later discontinued. The Locust Control Organization was highly effective in India. During 1952 and 1953, the regional airspraying unit worked principally in the desert areas of Rajasthan. In 1954, India again asked for aid at the beginning of the locust season. Since that year the Indian Government has not needed outside assistance.

▲ Locusts ● Other Insects

INDIA

During the early airspraying for locust control in Iran, India sent a locust officer to Iran to observe operations. The officer watched each stage of operations, making his own checks of kills, insecticide mixing, and cooperative arrangements with local agricultural workers and officials. Upon his return to India, a request to the United States was made for a similar aid program. The Technical Cooperation Administration in State Department made a contract with the firm which had supplied planes and pilots in Iran, to take 3 sprayplanes and pilots to India for a demonstration.

Locust swarm in flight, India, 1951 Photo USOM/India

On June 30, 1951, W. B. Mabee arrived in India to make preliminary arrangements preceding arrival of the sprayplanes which were flown to Jodhpur, India from Tehran. He found everything in readiness for spraying. It was necessary to procure not even an extra funnel, measure or strainer. The first part of July, an operation base was set up at Bikaner, India.

Locusts move in on vegetation to feed. They may eat three times their weight in a single day.

A few swarms of locusts entered from the West, but the monsoon rains were delayed. Previous operations in Iran were directed against air-spraying of immature stages of locusts on the ground. During the wait for the monsoon rains and egg laying, advantage of the delay was taken to attempt swarm spraying. Each time a swarm passed the airport, or was reported as near-by, an attempt was made to spray the swarm in flight. Endless difficulty was encountered in having equipment, men, and insecticide available in time to do effective work at the place the

swarm passed. It was also found hard to maintain a spraying pattern when attacking flying swarms. In passing one direction, the locusts would be visible, and in making the turn, the light would be wrong and they would be invisible, making it necessary to do much unproductive flying to accomplish a small amount of spraying.

In order to evaluate the results after the swarms moved on, they had to be relocated when settled at night in order to determine the kill. Some kills were found at distances of 14 miles from the place where swarms were sprayed. There was no way of determining percentages killed. It was observed, that any swarm that had been sprayed apparently broke up or was dissipated. It was the general belief that a sprayed swarm became disorganized and lost effective concentration.

When the monsoon rains came and oviposition started, the outskirts of Bikaner were sprayed. In particular, a large swarm that was on the ground in the process of egg-laying was sprayed. A fair kill of the adults was accomplished. But the significant finding was discovered by a check for hatching in this eggbed some 15 days later. It showed that the new nymphs were being killed by the previous egg-bed sprays. Subsequently, as egg-laying continued, the air spraying was operated in many localities in the Rajasthan, spraying where infestations were the largest and most concentrated, and permitting the villagers and the ground units to operate on the lesser bands or the thinner concentrations.

The Locust Control Organization in India, under H. S. Pruthi's direction, was so highly effective that some difficulty was found in finding unkilled locusts to spray. During this first year's operations in 1951, Technical Cooperation Administration (TCA) of the State Department increased their organization in India and a Locust Control Project was set up with the Mission. This Project not only called for aid from the airspray unit, but also provided for the purchase of considerable equipment for use of the Plant Protection Department of the Ministry of Agriculture.

During 1952 and 1953, the regional airspraying unit also worked in India, principally in the desert areas of Rajasthan. Some of the vehicles and spray equipment purchased by TCA began to arrive and was sent out for use. It was during 1952 that W. B. Mabee also observed further egg-bed operations near Phalodi. Here again, spraying of a known egg-bed in two further instances gave excellent control of the hatching nymphs.

India's well-trained and equipped locust-fighting units are highly efficient. A jeep with power duster is shown spraying eggfields where locusts breed.
Photo USOM/India

In 1954, India again asked for airspraying aid at the beginning of the locust season. W. B. Mabee visited the infested areas in the company of K. B. Lal, Head of Plant Protection. In looking over the severe infestation there, W. B. Mabee found the TCA equipment put to good use. He observed plant protection trials of several newer insecticides. He had the opportunity to watch Indian pilots spraying locusts with Indian planes that were equipped with spraying accessories purchased by the Mission. It was at the conclusion of this survey that K. B. Lal smiled and said: "Perhaps we do not need your sprayplanes this year." This was the phasing out of demonstrations and aid to India on locust control.

India has permitted virtually no escapes to return in the fall on their western migration since 1952. Not only that, but India has carried more than her share of the burdens in the international aspects of the fight against locusts. Much in the way of materials, equipment, and personnel was sent by India to other countries to aid them in their battles. India sent equipment and teams to Iran, to Saudi Arabia, to Kuwait and to other countries while carrying her share of the responsibilities in the international locust control meetings.

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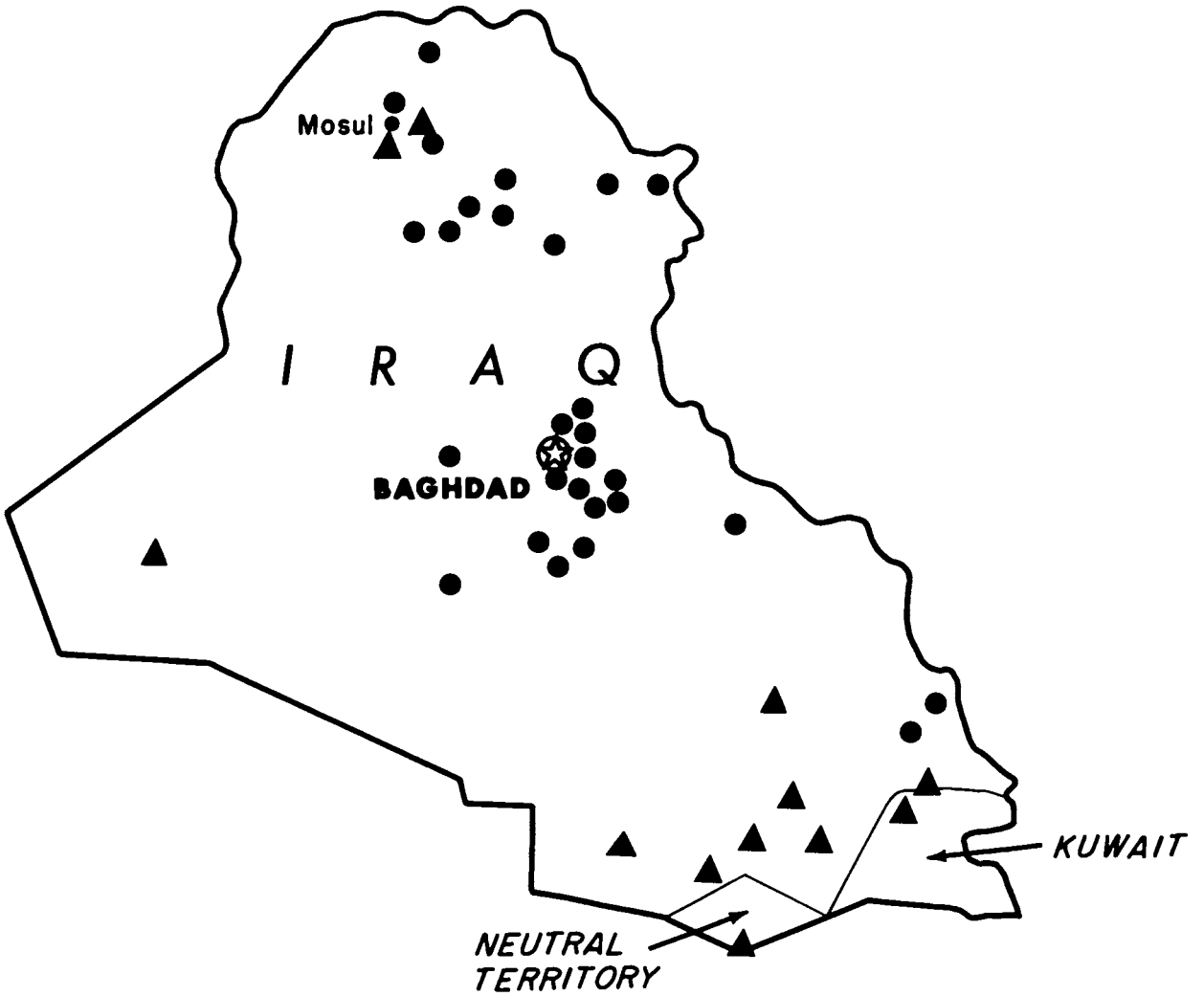


IRAQ--Areas of Major Project Assistance,

1951-1957

Control work in Iraq was done on locusts, senn pest, spiny bollworm, date leafhoppers, red spider, and wooly apple aphids during the years following 1952. By 1956 the Government was self-sufficient in the control programs on the locust and spiny bollworm.

▲ Locusts ● Other Insects

This spray plane is being loaded ready for flight.

The Regional Insect Control Project in Iraq since its inception in 1952 moved along well with a locust control program. In the first four years some 61 spraying demonstrations on eight crops and 13 insects involving 31,296 acres, were conducted. Six sprayplanes, 18 trucks, 28 power sprayers and 426 hand sprayers and over 60 tons of new insecticides were imported during that time.

Most of the work was done on locusts, senn pest, spiny bollworm, date leafhoppers, red spider, and wooly apple aphids. By 1956 the Government was self-sufficient in the control programs on the locust and spiny bollworm. Its technicians had been trained in the techniques of control and Iraq had purchased her own airplanes, sprayers and supporting equipment. As a whole Iraq is becoming more cognizant of the insect problem and is finding there are answers to their insect problems.

Locust control leaders met in the Great Iraq Desert in 1952 to start the year's campaign against the locust plague in Iraq. Left to right, John Hewitt from Great Britain, officer-in-charge of the Desert Locust Control for the Persian Gulf; William B. Mabee, director of the U. S. Locust Control Program in the Middle East, Africa, and South Asia; Keith Anderson, U. S. spray pilot; and Lewis H. Rohrbaugh, director of the Technical Cooperation Program in Iraq. Photo by USOM/Iraq

Full-grown but dead locusts are shown in the Great Iraqi Desert. One of the first photos of the 1952 campaign against the locust in Iraq. Photo by USOM/Iraq

New types of equipment are being purchased and more farmers are purchasing hand sprayers. The Extension Service has been instructed in the fundamentals of insect control and in turn is teaching the farmers simple methods with hand sprayers and hand dusters.

In 1951, the cotton acreage was 281,000 acres and in 1956 it was 125,000. The reduction was due to the lack of control of the spiny bollworm. Yet, Iraq is the leading Country in the control of spiny bollworm in the Near East.

Publications, bulletins, and periodicals have helped the Plant Protection Department to place orders for insecticides in the United States.

While it may be difficult to measure good will, it is not hard to see that the insect control program is one of the most widely accepted in the Country. Some typical examples of work in Iraq are:

Pilot and mechanic training in Iraq has been an important practical part of the program. Photo USOM/Iraq

In July 1954, a survey for date leafhopper was made on palms in Liwas Hillah and Karbala. Three million date palm trees were surveyed.

On January 8, 1955 a survey of wooly apple aphis was begun for fifty miles along the Tigris. 13,400 trees were found severely infested.

On May 20, 1955, Mr. Gilbert Bottger, Regional Project entomologist in Iran, brought 6,000 senn pest parasites from Iran and gave them to Iraq to rear at Abu Ghraib.

The Plant Protection Division completed dusting more than 900,000 date trees with BHC for control of date palm leafhopper.

On October 8, the Iraqi Plant Protection Department completed hand dusting with sulphur on 2,293 acres of cotton for control of red spider.

On October 27, aphid specimens were sent to Washington. These were later identified as spotted alfalfa aphid which had been causing intensive damage in the United States. Thus, Iraq had potential parasites for shipment to the United States.

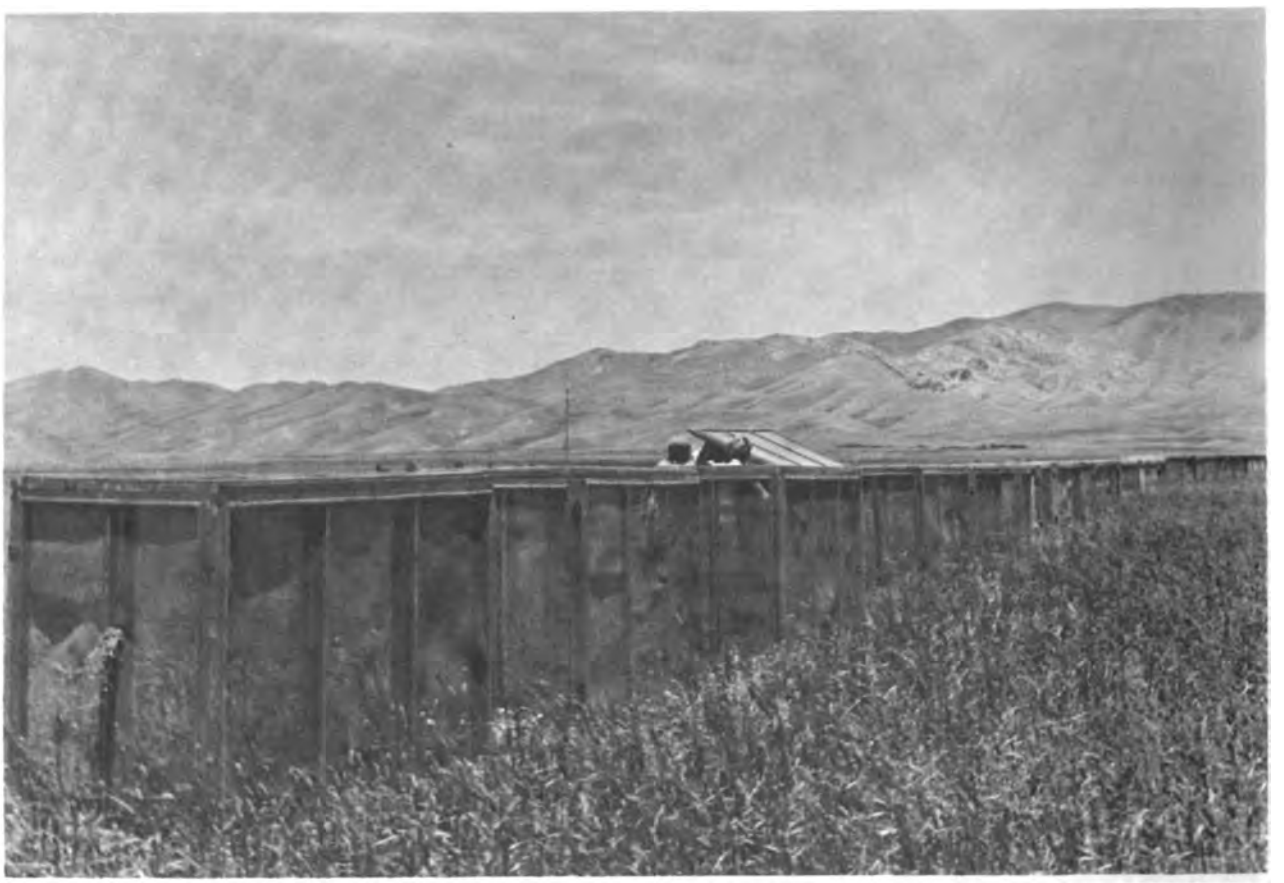
The beginning of 1956 brought the program of three Regional meetings on plant pest control during February and March. These meetings were held in the Regions of Basra, Hilla, Zaffarania, and Kirkuk. They were designed to familiarize and encourage agricultural workers to work in the field with the villagers and small farmers. Demonstrations were held on the use of hand sprayers on control of aphis.

Work on date palm leafhopper was left largely to Plant Protection except for a few demonstrations on the practicability of airplane applications of insecticides to the date trees. Trials were not successful since the sucker plants of the palm trees were not well treated because of insufficient penetration of insecticide due to the height of the airplane from the ground.

An intensive program on the control of the senn pest was begun by the Plant Protection Department on cereal grains in northern Iraq with large-scale field demonstrations during April and May. They extended from Halebja to the Sulamaniyeh-Kirkuk sand about 30 kilometers west of Sulamaniyeh. A total of 756 acres were treated

Adult senn pests shown on grain heads above hand. The nymphs and adult bugs injure the plant by sucking the sap from it.

Government of Iraq hand spraying crew spray senn pest on barley in areas of northern Iraq where air craft is not practical. May 1957.

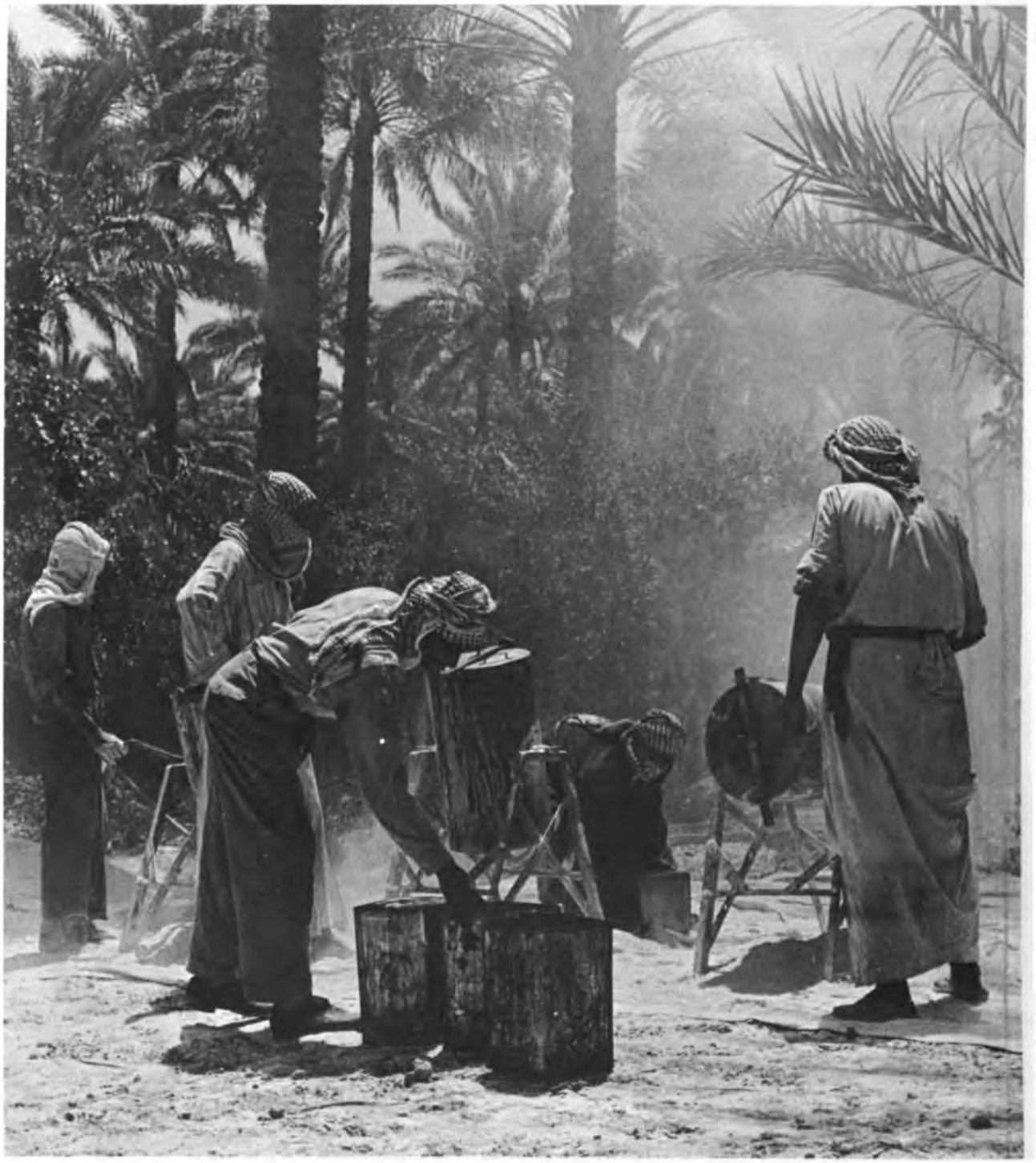


A line of Government of Iraq research cages are used for senn pest studies in Northern Iraq. The crew inserts live insects into cages for spray tests. May 1957.

at this time, but many more were treated by airplane and hand sprayers later.

DDT gave the best control as it had a long residual effect, actually lasting to 30 days, even after rain storms and high temperatures. Chlorthion and parathion gave excellent control, up to 100 percent after three days, with quick killing effect, but had only two or three

U. S. Pilot William Schaeffer, of Honesdale, Pa. is briefed by Dhia Ahmed, Iraqi Director of Plant Protection. Photo by USOM/Iraq



BN 5598

Government of Iraq team hand mix date palm dust of nicotine, lime and ash. May 1957.

W. B. Mabee, Coordinator, Regional Insect Control Project, is shown in the Iraqi desert as he adjusts a pump on a spray plane. Photo by USOM/Iraq

days residual effect. There was some reinfestation of the chlorthion and parathion-treated fields, but if senn entered into the DDT fields, the killing effect of the DDT was still strong enough to wipe them out.

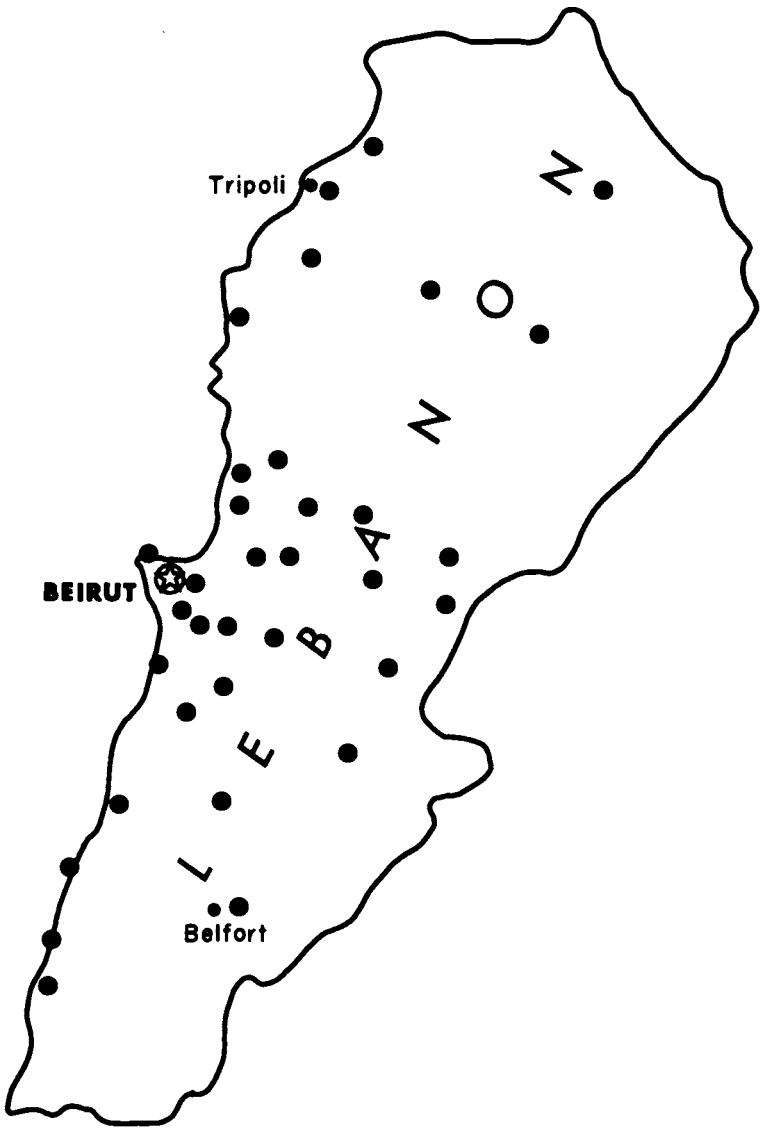
Iraq has demonstrated conclusively that senn pest can be controlled by DDT, chlorthion, and parathion. Research and more demonstrations should be carried on continuously to search for better methods of control.

Insect control in Iraq has greatly expanded--expanded to the point where it is now deemed advisable to separate Plant Protection from Extension. The Insect Control Program of that Department now includes full-scale programs against locusts, spiny bollworm, "Dubas," and extends to the senn pest. It is still necessary to get insect control information to small farmers to make them self-sufficient in doing their own insect control work.

A serious problem with which the program is faced is that of stored grain pests which are reported to have destroyed from 10 to 30 percent of the harvested grains. Certain chemicals have been found on the market that can be applied directly to crops such as wheat and barley in the storage rooms without damaging taste or odor of products made from the treated grain. Better methods of storage are in process of development and some new large-sized silos are being built.

Except for advice and assistance on some test demonstrations in the use of aramite and systox in the control of spider mites on certain field crops, the Ministry has gone along with little help.

The Plant Quarantine Section is a part of Plant Protection. The majority of insect and plant disease controls are carried out by the Government or under its supervision. Equipment and chemicals are provided for a non-profit fee. The Government programs are confined to particular pests to which funds are allocated.



BN-6511

LEBANON--Areas of Major Project Assistance,

1951 - 1957

The program for insect control began in 1956 in Lebanon. A study of the control of the olive fly, the number one enemy of Lebanon's olive crop, was made and new insecticides and bait sprays tested. Fifteen extension centers were established during the first year of operations.

▲ Locusts ● Other Insects

LEBANON

The basic plans for the Regional Insect Control Project program, in cooperationo with USOM/Lebanon and the Lebanon Ministry of Agriculture, for the calendar year of 1956 included the following:

A continued emphasis on developing plans for the increased use of modern insect control methods by working for the activation of designated agricultural extension centers by the Ministry and then working through these centers.

The distribution of spray equipment and insecticides purchased under U. S. mutual assistance funds for the extension centers, thus making these facilities more readily available to farmers when needed.

More emphasis on large-scale spraying demonstrations and actual field operations for the control of the more important plant pests of Lebanon.

Assistance to the Director of Extension and his Lebanese counterparts in training agricultural officers for more effective insect control. Also as an encouragement to the Ministry to select qualified employees for participant training in the control of plant pests in the United States.

A study of the control of the olive fly, Dacus oleae, by testing new insecticides and bait sprays against the number one enemy of Lebanon's olive crop. The success of bait sprays against related fruit flies in Hawaii and in the United States gives encouragement that they may be effective against the olive fly and the Mediterranean fruit fly in Lebanon.

During the first part of the year 1956, ten extension centers were established. Agricultural agents were appointed to operate them. Depending on the size of the area surrounding each center, one or two large 100-gallon sprayers, six to twelve knapsack sprayers, and varying quantities of emulsifiable malathion and aldrin were distributed to the center for loan and use of farmers. By the end of the summer, the Ministry had increased the number of centers and agents to fifteen and about 60 percent of the entomological equipment had been distributed to these centers. Each center was also equipped with office furniture provided by USOM. Most of the agents have driver's licenses. The Ministry agreed to issue them vehicles.

Locusts only rarely make their appearance in Lebanon.

Several major or outstanding meetings, in connection with the agricultural programs in which the entomologists assisted, were held in Lebanon during 1956.

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Khalil Shami, Lebanese counterpart, explaining in Arabic the operation of small spray equipment to a group of extension agents in a 2-week training course on extension methods. Photo USOM/Lebanon

The extension agent at the center at Jezzine reported good control of codling moth , mites, and aphids by the extensive use of malathion in apple orchards of all farmers in his area during the summer months. They applied 6 to 7 applications of spray every 15 to 18 days.

Spray equipment training is given Lebanese.
Photo USOM/Lebanon

The Ministry proposed additional funds for opening four to nine new centers during 1957. The remaining entomological equipment and insecticides were set aside for these centers as well as some increase allotted to the existing ones.

The fifteen agricultural extension centers were established in Lebanon at Aabde, Tripoli, Bechmezzine, Ghazir, Reyfoun, Bicharre, Sin-el-Fil, Damour, Dier-el-Kamar, Jezzine, Tyre, Hammana, Terbol, Tel-Amara, and Jabbouli.

Periodic visits to most of these centers during routine visits to farms proved that most of the entomological equipment was used during the spring, summer and autumn months. The spray equipment at the centers was in fairly good shape, though some showed extensive use and needed minor repairs. These indications of the use of equipment as soon as it was distributed was gratifying.

The mole cricket is a common pest in Lebanon. It feeds on seedlings and underground roots.

The CO-OP unit of the USOM agricultural staff conducted a short one-week course under the leadership of CO-OP and other government officials, agricultural extension agents and farmers. The Lebanese entomology counterpart led a lecture and discussion period on insects and insecticides.

The CO-OP section also arranged for twenty-five of the interested citrus growers of north Lebanon to go to visit a seven year old citrus grove considered one of the best in Lebanon, located between Tyre and Sidon. The purpose of this visit was to show these citrus growers the advantages of modern procedures. Many agricultural technicians accompanied them, including the entomologist. Each technician drew attention to his phase of the work. The excellent control of insects in this grove through use of a good spray program was shown. The importance of proper spacing of trees to admit sunlight was pointed out

as making for better cultivation, fertilization, and more efficient use of spray equipment. Good spray equipment and the use of new modern insecticides go hand-in-hand with these other features to make insect control in a citrus grove successful.

Capnodis borer damage to apple tree is shown in this photograph. Photo by USOM/Lebanon

Routine farm visits were made throughout the year, with perhaps an average of one or two visits per week. Invitations were received from farmers desiring the technician to see their farms or orchards because of their pride in them. Others wished to be advised on whether or not to make improvements. Some particular trouble developed on a farm and the technician would be called in to investigate. Two visits may be

cited as outstanding examples of the important roles simple farm visits sometimes play. One farmer requested a visit to his apple orchard at Laklouk at 5,000' elevation. It seemed the blooms were dying and dropping. It was the general consensus of farmers in the area that this was due to late frosts. What was found was a heavy infestation of thrips. Proper control measures should eliminate this problem. Another request to visit a citrus orchard caused us to investigate grotesque-shaped fruits. A serious citrus bud mite infestation was discovered. Even some of the counterparts had thought this problem to be physiological, rather than an injury caused by insects. A proper citrus insect spray program was recommended.

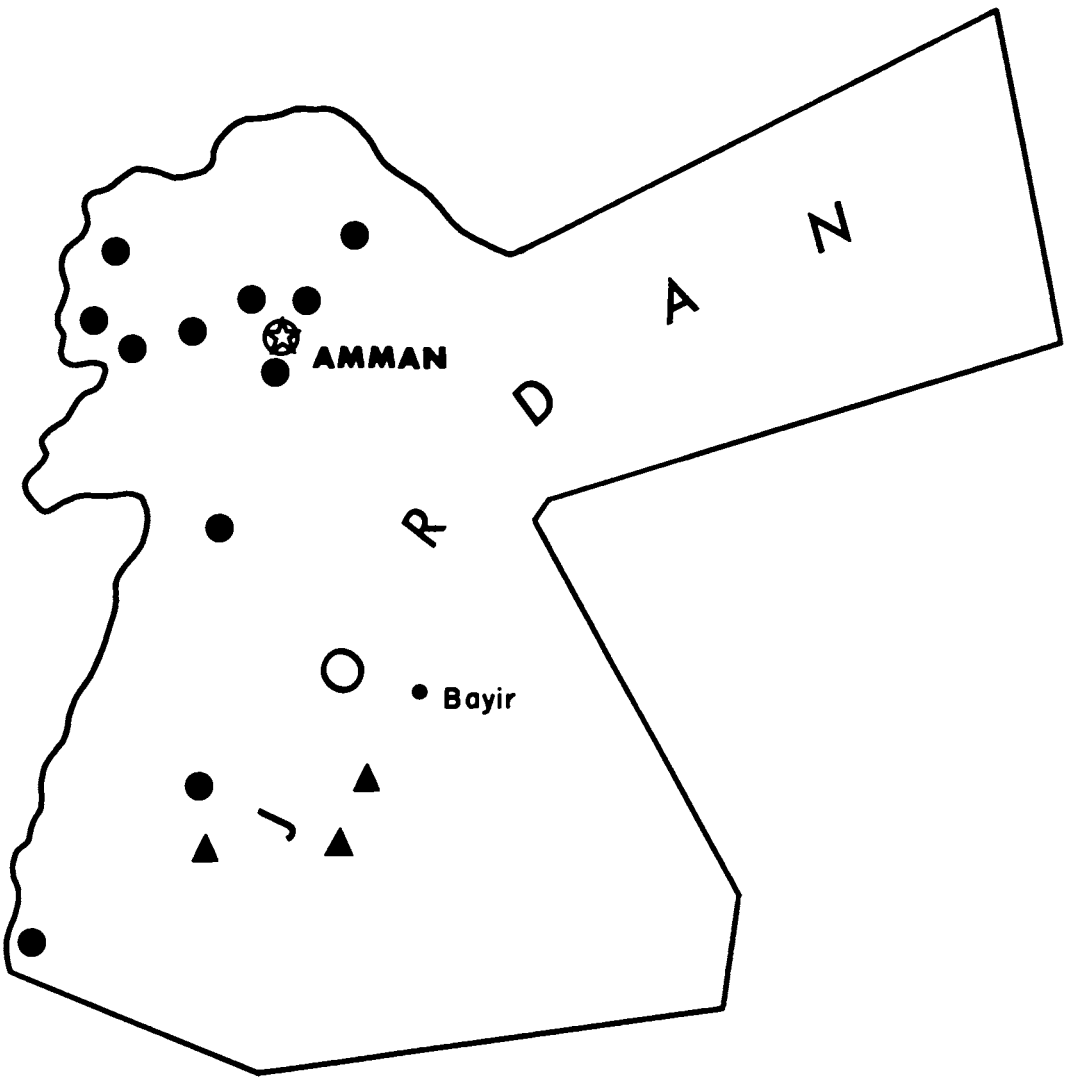
The technician is shown spraying pomegranates. Photo by USOM/Lebanon

By the end of the summer when the fifteen centers were fully activated, the entomologist and his Lebanese counterpart began making more or less periodic visits to the centers and contacting the extension agents. On these visits the agents were further instructed in the use, care, and maintenance of motorized spray equipment and advised on specific insect problems in their respective areas.

Toward the end of the year, it was learned that the extension agents came into the central Ministry extension office in Beirut the first of each month for their pay. Taking advantage of the situation, one to two-hour roundtable discussions and instruction sessions were held with them and central officials. This was found to be a good time to make specific appointments for visits to the agents at their centers.

Although insect spray demonstrations were not as large or as widespread as had been desired, those conducted were considered successful. Every opportunity offered for putting on a demonstration was utilized.

Among the more important demonstrations were those conducted against the wheat leaf miner on wheat, cottony cushion scale on citrus, codling moth, mites and aphids on apple and soil treatments for white grubs and mole crickets.



BN-6515

JORDAN--Areas of Major Project Assistance

1951-1955

Jordan uses a large number of sprayers and hand applicators. These are sold on time-payment plans to growers and landowners. In October 1955 the Regional Insect Control Project was closed in Jordan.

▲ Locusts ● Other Insects

JORDAN

In 1952 the Regional Locust Control Project transported two sprayplanes and two pilots to Jordan to aid in locust control activities. It was during this time that the Regional program also worked in Iraq. The late arrival of planes in Beirut somewhat delayed the start of work in Jordan.

In an attempt to find suitable areas for airspraying in Jordan, it became evident that an all-out control program was going on in the Country. The locust officers, together with the Arab Legion, had baited almost every available infestation. From the three small demonstrations, it was difficult to evaluate results, because parts of the areas had been hand baited and Arab Legion personnel were waiting to bait the remainder, being reluctant to wait for a determination of the kill from airspraying.

It was during this time too, that a rumor was spread to the effect that the death of a donkey and three goats had been caused by their feeding on plots sprayed with aldrin by ground equipment. There was hesitance in proceeding further with the work at the time. However, following this report, Tissel Jones of the Shell Corporation working with the Ministry of Agriculture's veterinarian set up a test to determine the toxicity of spraying with aldrin. The Shell Corporation purchased sheep and goats to pasture on a sprayed area for a long time. The results reported by the Jordan veterinarian indicated there was no evidence of ill effects.

In the early days of the Jordan program, a large number of sprayers and hand applicators were purchased for the Project and later sold on time-payment plan to individual growers and landowners throughout Jordan. The Mission also encouraged stocking modern insecticides in small packages so materials and equipment were available to growers as needed.

Most of the work done was similar to that of an extension entomologist who conducts small demonstrations here and there over the area with field men of the Ministry of Agriculture and interested landowners. The program of importing small equipment and making it available on a time-payment basis to the growers has, it seems, done much to contribute to grower participation and responsibility in insect control. The agricultural and insect problems of Jordan, aside from locust invasions, seem to lend themselves well to this type of operation ; or perhaps it should be said that the Jordan Ministry of Agriculture adapted the program to the type of insect problems which exist there.

BN 5596

How low can one get and still fly? The first airplane and pilot to land and take off from the shores of the Dead Sea at Sofi, Jordan, 1,286 feet below sea level, is shown above. Charles Klessig, the pilot, is spraying for mosquito control. The Regional Insect Control Project, October 24, 1955.

As far as locust control in Jordan goes, they are doing exceptional work, principally with hand labor and with the aid, when necessary, of the Arab League. They have also contributed materially to locust control in Saudi Arabia, both before and since the FAO International Campaign.

With the termination of Mr. Livingstone's tour of duty in October, 1955, the Regional Insect Control Project's work was closed in Jordan until such time as some emergency or some outbreak develops, or there may be specific need for some technical assistance.

BN-6518

LIBYA--Areas of Major Project Assistance

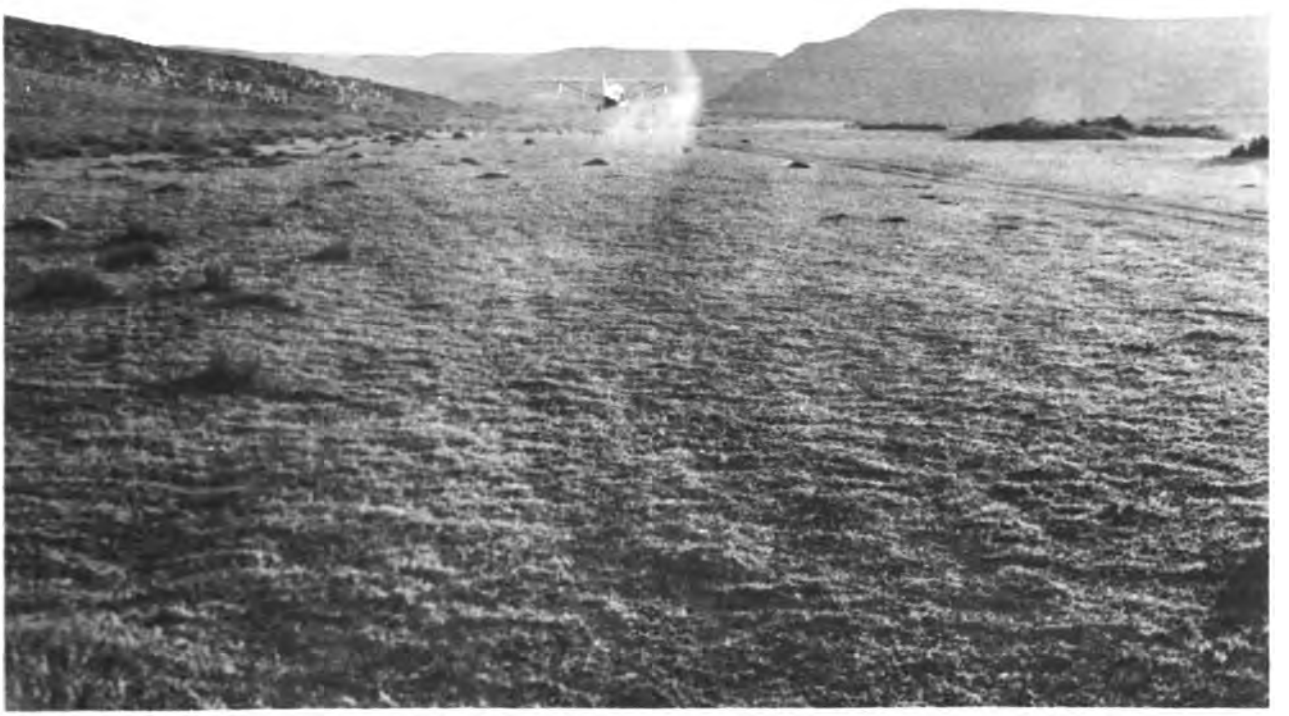
1955-1957

Libya is an independent Kingdom comprised of three provinces: Tripolitania, Cyrenaica and the Fezzan. All of its crops are vital to the young nation, as most of the country is desert and food scarce.

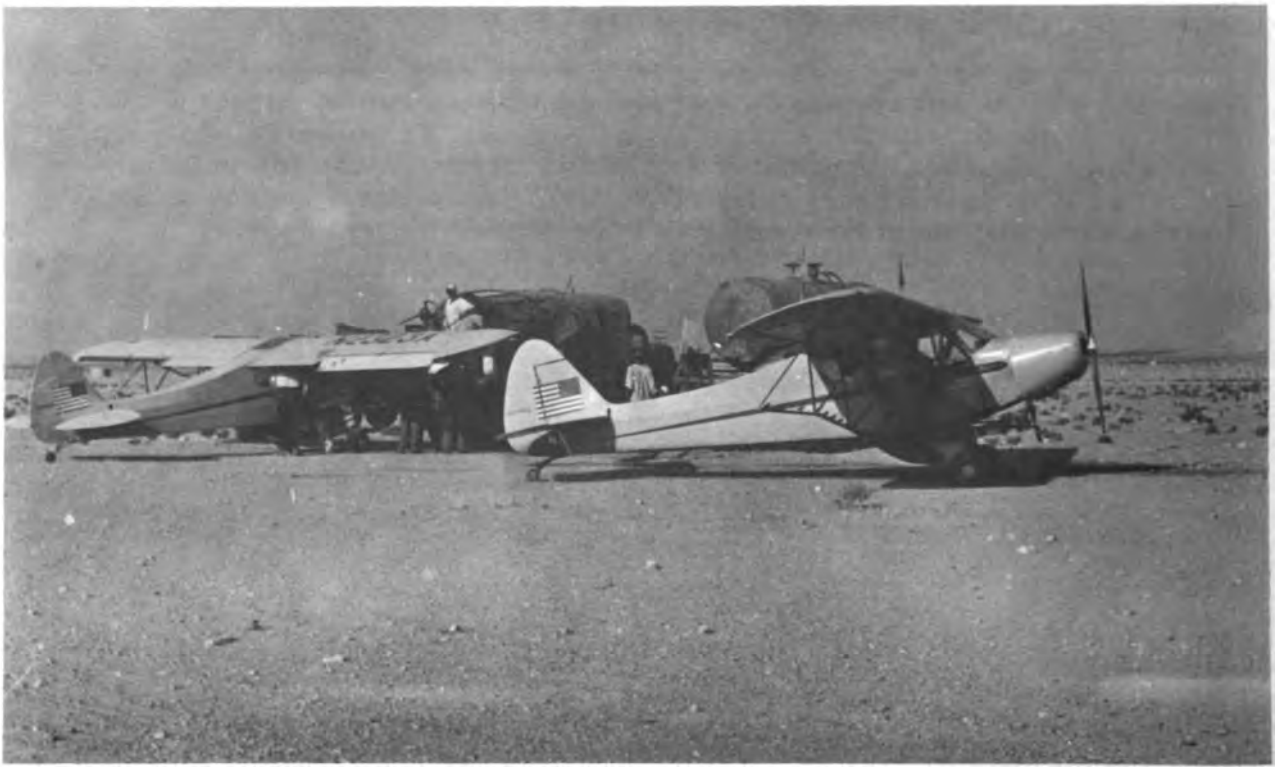
▲ Locusts ● Other Insects

LIBYA

Libya, as it is known today, is a young nation, born December 21, 1951. It comprises three separate provinces: Tripolitania, Cyrenaica, and the Fezzan. Although it is one of the largest countries in North Africa, it is one of practically all desert, except for a narrow coastal strip along the Mediterranean and a few places in the interior.



Pasture land is airsprayed for locust control at Beni Ulid.



Airspraying operations are shown on the Azizia plains, Libya.

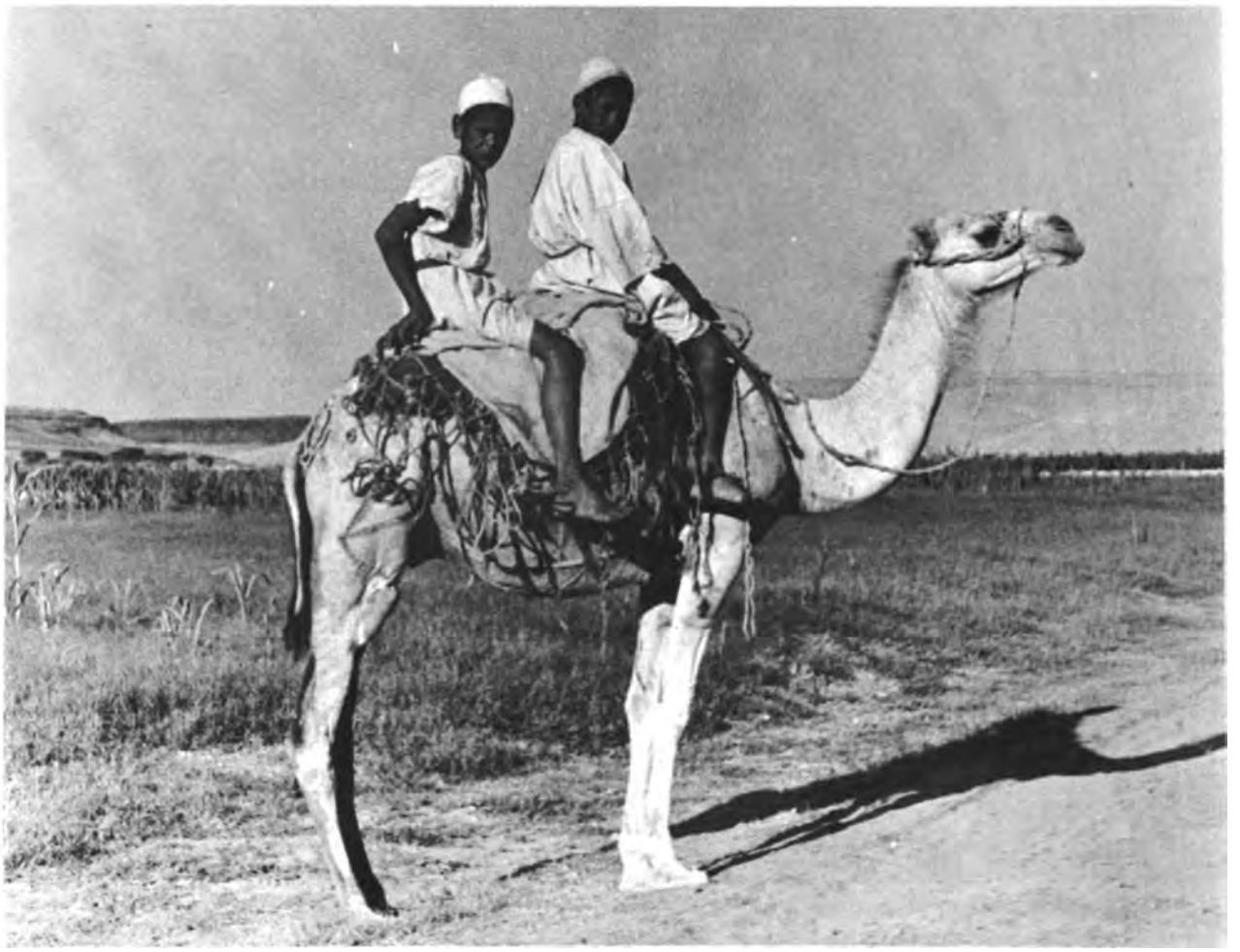
Regional Insect Control Project work in Libya has consisted mainly of activities in desert locust control. The Regional Insect Control Project was asked to come to Libya to assist in emergency measures taken to meet the locust threat to farmers' crops. Three aerial spray planes with pilots were sent to help with the control work. An entomologist was assigned to Libya to help meet future needs for technical assistance in locust and other insect control. He arrived in November, 1955, at the time a large swarm of locusts invaded the coastal region.

Some of the insects in Libya are: the desert locust, fleas, flies, ants, mosquitoes, citrus cochineals; the fruit fly (Ceratitis capitata); the olive fly (Dacus oleae); aphids, mites, whiteflies, and other garden insects.

At Azizia Ed Landerholm, chief agriculturist, is spraying locusts.

The principal crops are: dates, olives, oranges, some grapes, grape fruit, almonds, apricots, apples, quinces, figs and peppers. These are practically all grown in the coastal area, except for dates and figs, which are found in most oases, and the olives which have been planted in the near coastal region.

Barley is the chief cereal and is grown along most of the wadis (dry river beds) having sufficient catch basins to provide the necessary moisture for growth. Some wheat is grown but for the most part in

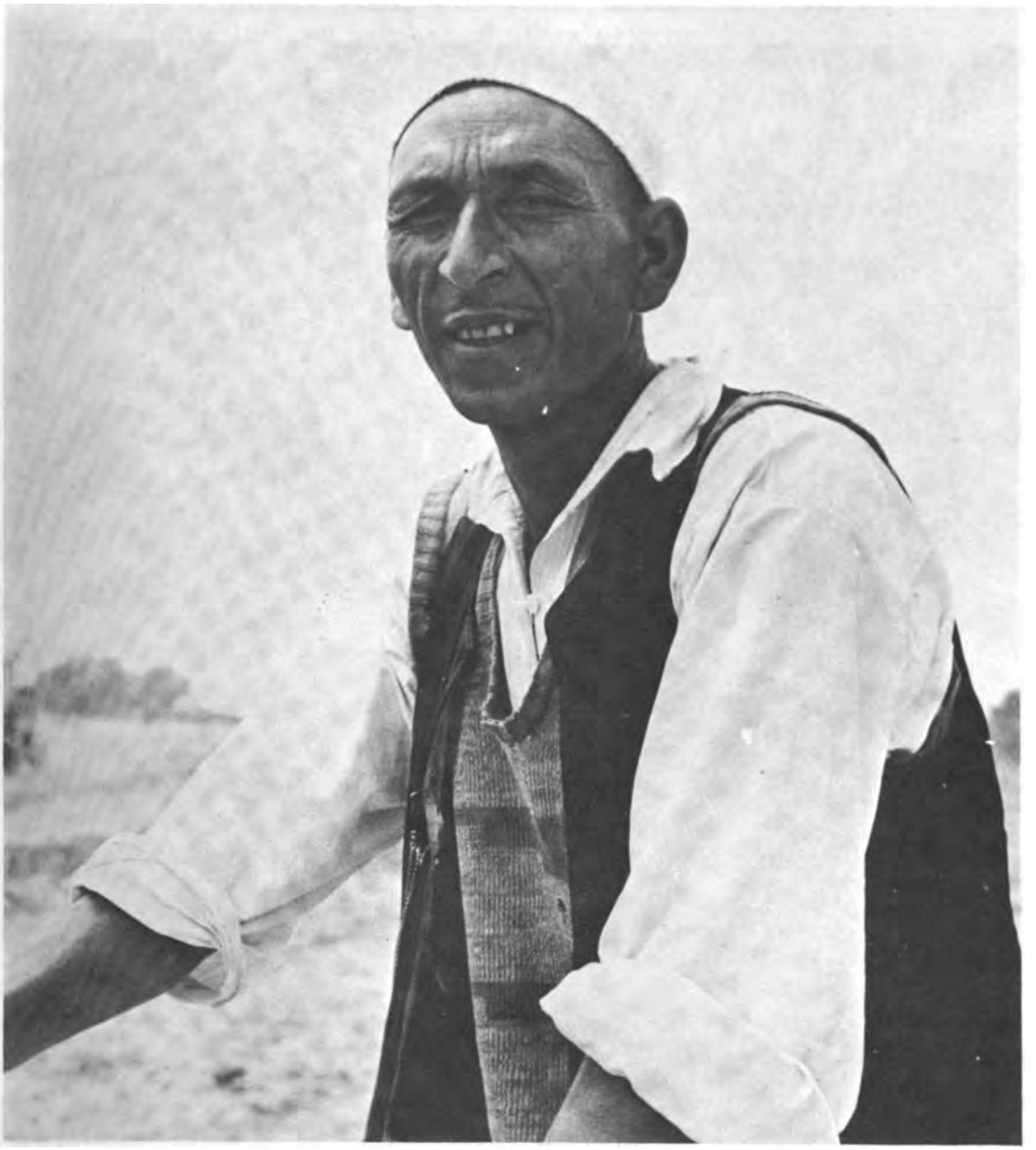


"Sidewalk superintendents," W. B. Mabee calls these children watching the insect control efforts.

the small Barce Plain in Northern Cyrenaica Province.

Esparto grass found in sparse tufts in the desert is exported for the manufacture of fine paper.

Other crops produced in very limited amounts are maize, sorghum, millet, peanuts, and garden vegetables.



This landowner in Libya is interested in insect control on his farm.

Food for man and animals, water and transportation are the great needs of Libya. All its crops are vital to the young nation, as most of the country is desert and food scarce. There are no flowing rivers in all of Libya. Transportation away from the coastal region is mainly by camel or donkey caravan.

471778 O - 58 - 6

This almond tree at Azizia is literally loaded with locusts.

The population is mostly Arab, with some Italians, British, some Americans, and a limited number of other nationalities. The bedouins in the interior are nomadic shepherds continually in search of grazing land for their sheep, goats and camels. A few cattle are found in the coastal region.

Reports of locust activities in the Sudan and Lake Chad Territories to the south of Libyan borders are received regularly by the Locust Control Center in Sidi Mesri. Most of the locust invasions in prior years have come from these areas.

Two Regional Insect Control Project spray planes are held in a 'ready condition" with sufficient stocks of aldrin chemicals on hand to meet any normal invasion.

Numerous airplane flights were made during the year in all three Provinces of Libya for reconnoitering purposes.

In Libya in 1957, the desert locust was first seen in the Fezzan during January and February when several small swarms passed through the border into Algeria and Tunisia. The invasion proper commenced by the infiltration of small swarms across the Tunisian border into Western Tripolitania during March and April. Some swarms appeared in Cyrenaica, but were small and passed on into Egypt.

Prompt action by all units in the field succeeded in killing most of the hoppers before they reached croplands. Several fledgling swarms did get into olive groves at Zentan (in the gebel near Giado) and stripped the bark off the trees before they were killed or dispersed. There were some escapees to the south from this area.

BN-6516

AFGHANISTAN--Areas of Major Project Assistance,

1955-1957

Since 1955 the Afghanistan government has been aided in pest control efforts. The country is remote and difficult of access, as there are no railroads, few modern roads and irregular air flights. Senn pest is a serious problem in the northwestern part where wheat is grown by dry farming methods. Along the Oxus River next to Russia the government has been aided by the U.S.S.R.

▲ Locusts ● Other Insects

AFGHANISTAN

In February 1955, the Ministry of Agriculture of Afghanistan requested assistance of a locust control technician to train personnel for locust control and in the field of general entomology, as related to the control of major insect pests of agricultural crops of the country. Meetings were held by the Ministry of Agriculture, the United States Operations Mission to Afghanistan, and the Coordinator of the Regional Insect Control Project. In March, 1955, a Special Agreement was signed between the Regional Insect Control Project and the United States Operations Mission.

Following this agreement, two planes and pilots were made ready in Karachi, the shipment of aldrin was started from the stockpile in Karachi, and a small shipment of malathion was started from Beirut. However, before the equipment could get to Afghanistan, tribal disorders on the borders of Afghanistan and Pakistan prevented the entrance of the equipment. The planes and pilots were held undelivered for a considerable time, for the situation did not clear in time to get this equipment in for the current growing season.

Afghanistan is remote and difficult of access, as there are no railroads, very few modern roads, and irregular airflights. Most of the farm land in the country is found in stream and river valleys, which comprise only about five percent of the total land area. Irrigation waters are derived chiefly from water spreading of the snow-melt waters that run down these valleys. In the northwestern part, however, there is a rather extensive area in which wheat is grown by dry farming methods on the high plateaus. It is in this area that senn pest is a rather serious problem. A survey of the insect problems was started in June, 1955 to determine the needs for an insect control program. The spiny bollworm is present in the Khandahar Province and the Jallalabad Province, but it is not found in the northern provinces. The pink bollworm has been reported in Jallalabad.

The senn pest is found only in the Northern Province of Maimana. At the time the area was surveyed they were found hibernating under plant debris and rocks in the harvested grain fields. A demonstration program of control with DDT was started in April 1957.

Another control program was started in 1957 against an almond webworm. The work was carried out on a cooperative basis between the Afghanistan Ministry of Agriculture and the tribes and villages of the Kalat area. An agreement was drawn up by the Afghanistan personnel and co-signed by them and the village chiefs so that commitments would be carried out by each side.

The farmer is receiving on-the-job training from the Plant Protection Division worker of the Royal Government of Afghanistan. Aldrin spray is mixed for control of grasshopper outbreak. The campaign was conducted by the Regional Insect Control Project. Photo USOM/Afghanistan

Personnel in the Plant Protection Department is limited. An entomologist is in charge of the operation. He has 14 helpers who have educations that would compare to third and fourth grade up to tenth grade. None of them speak English.

There are two jeeps for travel. Knapsack sprayers and twelve 30-gallon power orchard sprayers make up the rest of the equipment.

There is a stock of insecticides consisting of 200 tons of BHC donated by the Russians. There are also a few tons of DDT dust in supply.

Where the Moroccan locust occurs along the Oxus River next to Russia, the Government of Afghanistan has been aided by the U.S.S.R. There is a mutual aid agreement which deals with locust control and calls for twenty annual meetings which are held alternate years in Moscow or Kabul. The 1956 meeting held in Kabul was the 13th annual meeting.

Afghanistan is a rugged mountainous country as well as a desert area. The people are very poor. The terrain as well as the economy and the small quantity of supplies and equipment made it a difficult area in which to work. However, as in all other areas where the Regional Insect Control Project has started, the nationals are in great need of demonstrational work so that with their cooperation, a start can be made in solving insect control problems.

Actually the insect control program first got under way in Afghanistan in 1957. In the Mimanah Province, for example, the farmers were still fighting the senn pest by letting the wind blow smoke from the hay fires across the wheat fields where the adult insects were feeding. In spite of the limited personnel, shortage of equipment and insecticides, and transportation, a start was made in 1957 to make the Ministry of Agriculture and farmers cognizant of new available insecticides for control of insect pests. Included, was the plan for aerial demonstration with aircraft by RICP planes and pilots. The RICP airplanes finally entered the country after attempting for three years to do so and demonstrations of aerial spraying were made at Kalat and Ghazni. The pre-spray goal had been set at 400,000 fruit and nut trees and the final figure was 500,000 or 25 percent more trees than the officials had hoped could be sprayed. This program proved three things to the Ministry. (1) A large scale operation could be carried out and the farmers' confidence gained. (2) The control of insects over such a wide area cannot be carried by the government alone, except in epidemic situations like the locust outbreaks, but must include the training of farmers to handle their own problems. (3) The use of airplanes for major outbreaks of epidemic insects is feasible.

Farmers are instructed by a Plant Protection worker on the use of BHC and road dust for control of outbreak of grasshoppers. Photo USOM/Afghanistan

In another program, in the Jalalabad area the impetus came from the farmers. They had seen the results of demonstrations for control of the white fly on citrus (sour orange) and were so impressed they requested to be shown how to spray. We had only enough malathion left for them to spray 4,000 trees, but this was the first help the farmers had received from their government.

Farmers are shown receiving instruction on grasshopper control from a member of the Royal Government of Afghanistan's Plant Protection Department. Aid was given them too, by the Regional Insect Control Project's funds and personnel. Photo USOM/Afghanistan

In the Logar Valley 40 miles from Kabul there was an outbreak of grasshoppers. Three villages were selected for demonstrations. Never before had these people been helped in insect control.

One of the first things the Ministry of Agriculture requested was advice on a basic quarantine and inspection law with more detailed recommendations for fumigation. The Russians had been stopping cotton exports to the north in past years and the Iranians and Pakistanis had been holding up fresh shipments at other entry stations of this land-locked country until prices dropped or fresh fruit spoiled, on the assumption that there had been no treatment of diseases or insects on the Afghanistan exports. A good law for plant quarantine export regulations is being proposed to the national governing assembly this year. Working regulations for a plant inspection and quarantine department were also written.

Afghanistan plant protection officials explain to farmers the use of chemicals to control insects.
Photo USOM/Afghanistan

BN-6517

ETHIOPIA--Areas of Major Project Assistance,

1952-1957

While general insect control was in its infancy preceding 1955, locust control was pushed ahead rapidly in Ethiopia. During 1956 there were important developments in regard to pest control. Ethiopia's interest in international locust affairs was shown by sending representatives to the annual meeting of the FAO locust control committee in 1956.

▲ Locusts ● Other Insects

ETHIOPIA

The Ethiopian Ministry of Agriculture has made great strides in plant pest control in recent years. Rather broadly experienced in locust control, the Ministry is now giving increasing attention to other important pests. Sizable appropriations have allowed the hiring of a number of additional technicians. Although still limited in numbers, available Ethiopian technicians are becoming more plentiful through selection, training and broader delegation of authority.

While general insect control was in its infancy preceding 1955, locust control was pushed rapidly ahead. Those who saw or experienced pest control operations were interested and appreciative. With the ever increasing economic standards, more demands for pest control may be anticipated.

Commercial interests in pest control have been intensive. Through demonstrations and cooperation by the Ministry of Agriculture, these commercial aspects should develop, so the necessary pesticides and application equipment are readily available.

Statistical data obtained in the Nazareth area during the recent September locust breeding showed the damage done in agricultural lands. Strong support was lent to the approval of the recent locust budget by the following:

"Teff" (lovegrass seed)	Eth. $17.00 per quintal 1/
Wheat	11.00 " "
Barley	7.00 " "
Beans (white)	17.00 " "
Corn	7.00 " "
Peas (chickpeas)	11.00 " "
Sorghum	7.00 " "

Average price per quintal for commodities grown:
Eth. $11.00 (U.S. $40)

1/ One quintal is equivalent to 220 pounds.

An estimated average yield of combined commodities per gasha (90 acres) was 390 quintals. 390 quintals at $11.00 equals $4,290.00 or the total production for one gasha. An area of 500 gashas was damaged to an estimated extent of 50 percent. (Beans were most extensively damaged, but the average of $11.00 per quintal was used in calculations.) $4,290 times 500 gashas minus 50 percent equals Eth. $1,072,000 (U. S. $428,800), damage in this one area.

BN 6356 x

An Ethiopian flagman sits atop a termite mound, while he guides U. S. sprayplanes in a locust control campaign.

Fence posts are soaked in pentachlorophenol in old BHC drums to protect the wood against termites.

Another adjacent area of 200 gashas was similarly estimated at Eth. $750,000 (U.S. $300,000) damage by the locust invasion.

These estimates were only two taken from five similar communities invaded by the same swarms in a 15-square mile area.

Agriculture is diversified and follows old custom trends in most of the country. Tools for the development of a pest control program were non-existent, since no national program had been instituted.

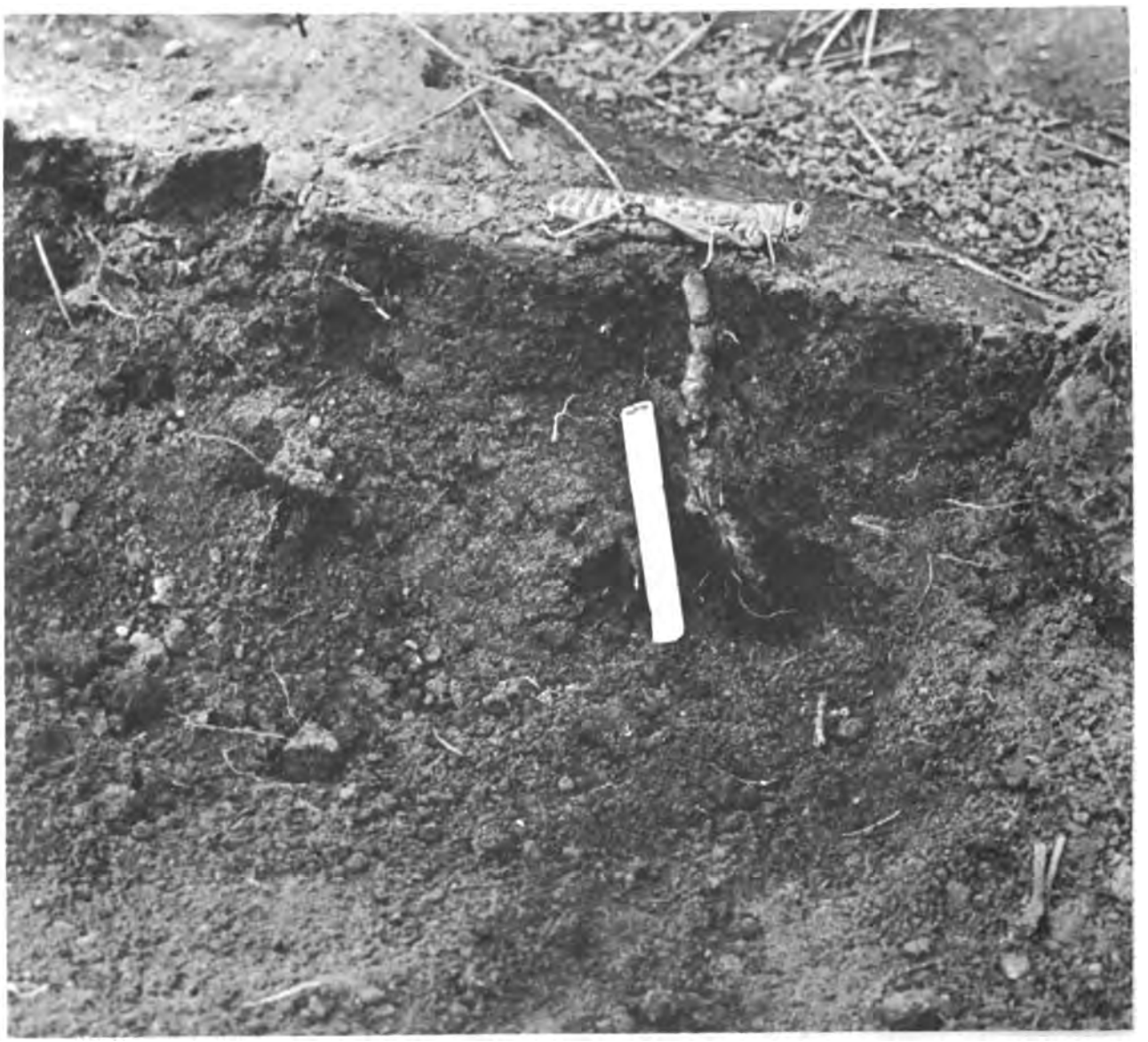
In the training of nationals as counterparts, agricultural education is the first step. Entomology activities are coordinated with other technical agricultural programs.

Major pest problems which are not formally recognized by the Minister, include corn stem borer, pink bollworm, corn earworm, livestock parasites, cutworms, aphids, fruit flies, and plant diseases. Many of these have been observed, but no organization exists to do experimental or demonstration work.

A new $20,000-joint-fund proposal for extended pest control was proposed to the Ministry of Agriculture. The plan consisted of following through on the proposal and of training nationals.

During 1956 there were several important developments in regard to pest control. They might be called climaxes to the four years of United States Technical cooperationin Ethiopia by some; others might term them crises in the development of a Plant Protection Section within the Ethiopian Ministry of Agriculture. In either instance, progress toward a planned and more scientific approach to pest control and its importance to the country's agricultural economy was indicated.

These developments began in December 1955 and continued into 1956. In the beginning a permanent locust control staff was organized and independently established with a budget and equipment. Due to the low ebb in locust activities during 1956 throughout Ethiopia, there was retarded action in purchasing extensive equipment and supplies. However, the organization functioned by keeping personnel in the field and purchasing some necessary equipment. A monthly locust situation report was compiled and distributed. The organization took a firm and positive position in the international locust meeting held in Ethiopia in February 1956, by stressing international efforts in the East African area. Ethiopia's interest in international locust affairs was shown by



Egg capsule of the locust showing length of egg pod in relation to size of cigarette.

sending representatives to the annual meeting of the FAO locust control committee later in the year.

During 1956 several reports were received and surveys made of army cutworm damage to agriculture in many parts of the country. The locust field units conducted some demonstrations of control by use of locust poison bait on the worms. However, due to a technicality of use of locust funds on pests other than locusts, further activities were stopped. This situation and other developments in the interest of multiple pest problems resulted in the approval of a joint fund for pest control under the Agricultural Cooperative Services Agreement between the United States Operations Mission to Ethiopia and the Ethiopian Government.

The approval of the Pest Control Project climaxed an acknowledged need, and interest of the Ethiopian Government. The Project represents a graduated step toward unification of existing locust control organization, study of present problems, demonstration of modern equipment and pesticides, training personnel and points toward the establishment of a permanent overall Plant Protection Section within the Ministry of Agriculture. The action is timely in consideration of developments in Agricultural Extension education and agricultural experimentation within the country.

Ethiopian locust control unit in the field.
Photo USOM/Ethiopia

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Various organizations such as the British Desert Locust Control Organization, Food and Agriculture Organization of the United Nations and the Regional Insect Control Project assisted the local government in combatting the desert locust plague. However, with the development of trained personnel, provision of adequate funds, material, and equipment by the Ethiopian Government, United States assistance was largely phased out of locust work with a shift in emphasis to other pest control problems.

Money from the Joint Fund was used to purchase supplies and equipment to carry out small scale demonstrations for the purpose of showing the farmers that they need no longer tolerate extensive crop losses, and to find out what pesticides were practical for use in Ethiopia.

As a further expansion of locust and pest control work in 1957, the Regional Insect Control Project, at the request of the Ministry, sent in two Piper Cub spray planes and a pilot-mechanic. The planes can be used on an emergency basis to assist the Ministry with desert locust control activities.

From reports from various sources, as the results of demonstrations carried out by the Regional Insect Control Project, Extension Service, Animal Improvement Project and Malaria Control, there is a growing desire for pest control chemicals.

Import, export and domestic plant quarantines are non-existent. However, protection of Ethiopian agriculture through quarantines is under consideration by the Ministry of Agriculture. Also under consideration is a basic plant pest law under which the Ministry of Agriculture will be authorized to carry out control programs and operate and enforce plant quarantine regulations.

Accompanying pest control and regulatory programs must be developed an educational program. As practically all of the pesticides used in agriculture and other pest control programs are toxic to man and animals to a greater or less extent, the safe use and handling of these dangerous chemicals must be strongly emphasized. Information on plant quarantines should be made available to inform the public and shoppers of the purpose of plant regulations and procedures.

Ethiopia has a great potential in agriculture, and enough food and fiber can be produced through improved agriculture to raise the standard of living for its people with surpluses for export. One of the quickest ways of increasing the yield and quality of agricultural crops throughout Ethiopia is through crop protection against pests, plant diseases and rodents.

MOROCCO

During June 1957 the U. S. Operations Mission in Morocco requested assistance from the Regional Insect Control Project.

The Government of Morocco proposed using money from a United States loan to finance their locust control operations. Since this had previously been supported by France, it was necessary to look elsewhere for financial support.

After conferring with both Mission and Ministry officials in Rabat, W. B. Mabee went with representatives of each to Agadir, the site of the field operations.

It was found that Morocco had sufficient good equipment and supplies and a well-rounded organization. The U. S. Operations Mission approved the use of United States loan funds for locust control support.

Later in the year, following alarming infestations of locusts, the U. S. Operations Mission and the Government of Morocco requested the Regional Insect Control Project to appraise the situation and possible need for further aid. In December W. B. Mabee again visited the area and went directly to the site of the control operations in the Sous Valley.

A period of cool weather which delayed locust development and movements, and the completion of air spraying contracts with commercial operators changed the picture. The Moroccan Locust Control Unit had the situation well in hand and no additional aid was then needed.

Observations were made on the operation of eight Cub planes and two heliocopters. Their three-motor and two-motor spray planes were examined. Ground equipment was active throughout the area and the locust kills were exceptionally good. Pictures of their operations have been forwarded to Washington and are included in this study.

Locusts killed by airspraying done by Moroccan contract planes near Agadir. Three companies were involved in the 1957 campaign.

Dead locusts from air spraying cover the ground in Morocco, December, 1957.

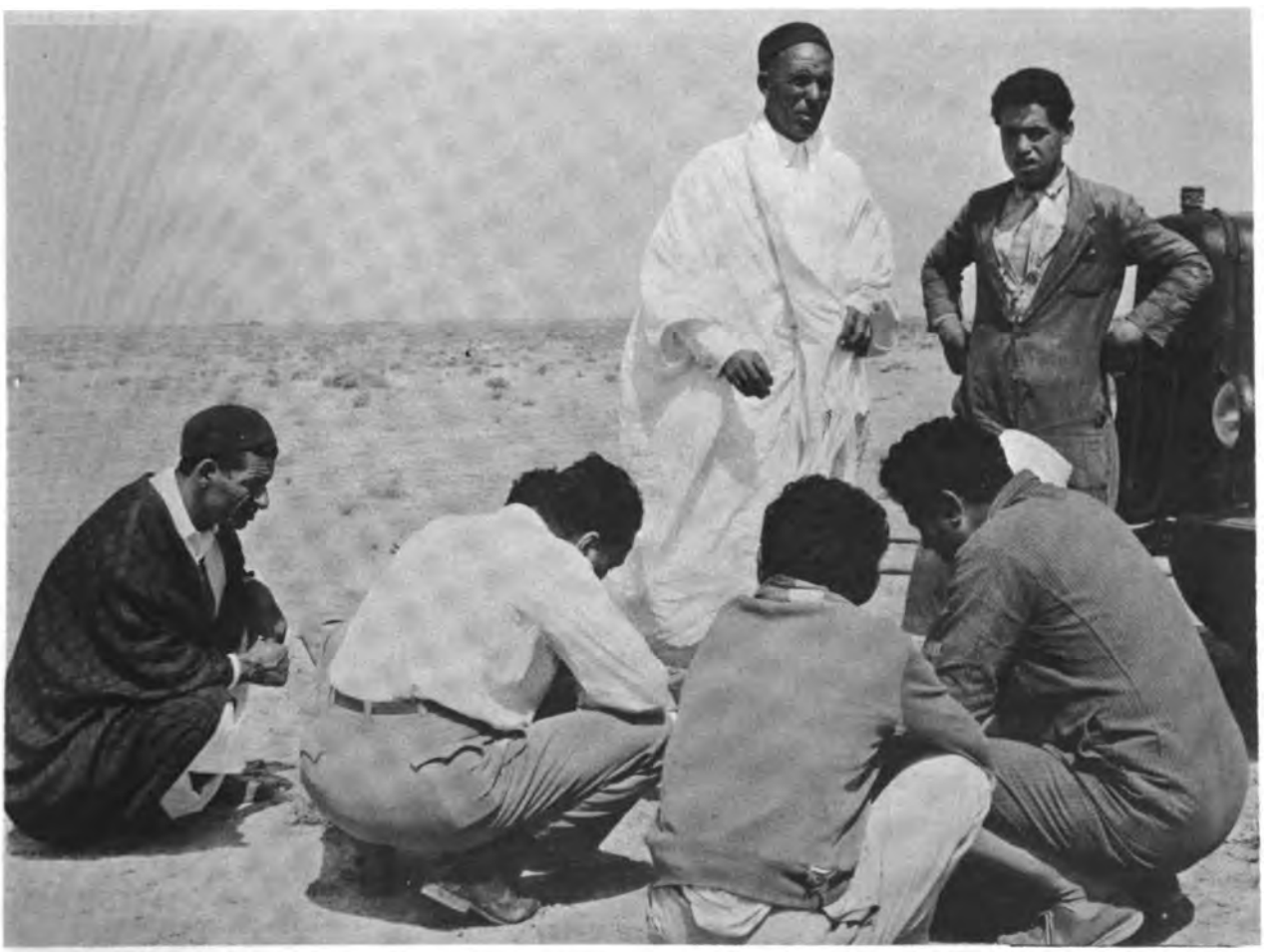
TUNISIA

Tunisia in 1957 was the scene of feverish activity resulting from a serious locust invasion which could have caused much loss to the agriculture of both Tunisia and Libya had it not been brought under control. The invasion began January 2, 1957 at Kebili and steadily advanced until all of central Tunisia west of Sfax was heavily infested. Egg-laying began in February and continued uninterrupted until the first of May.

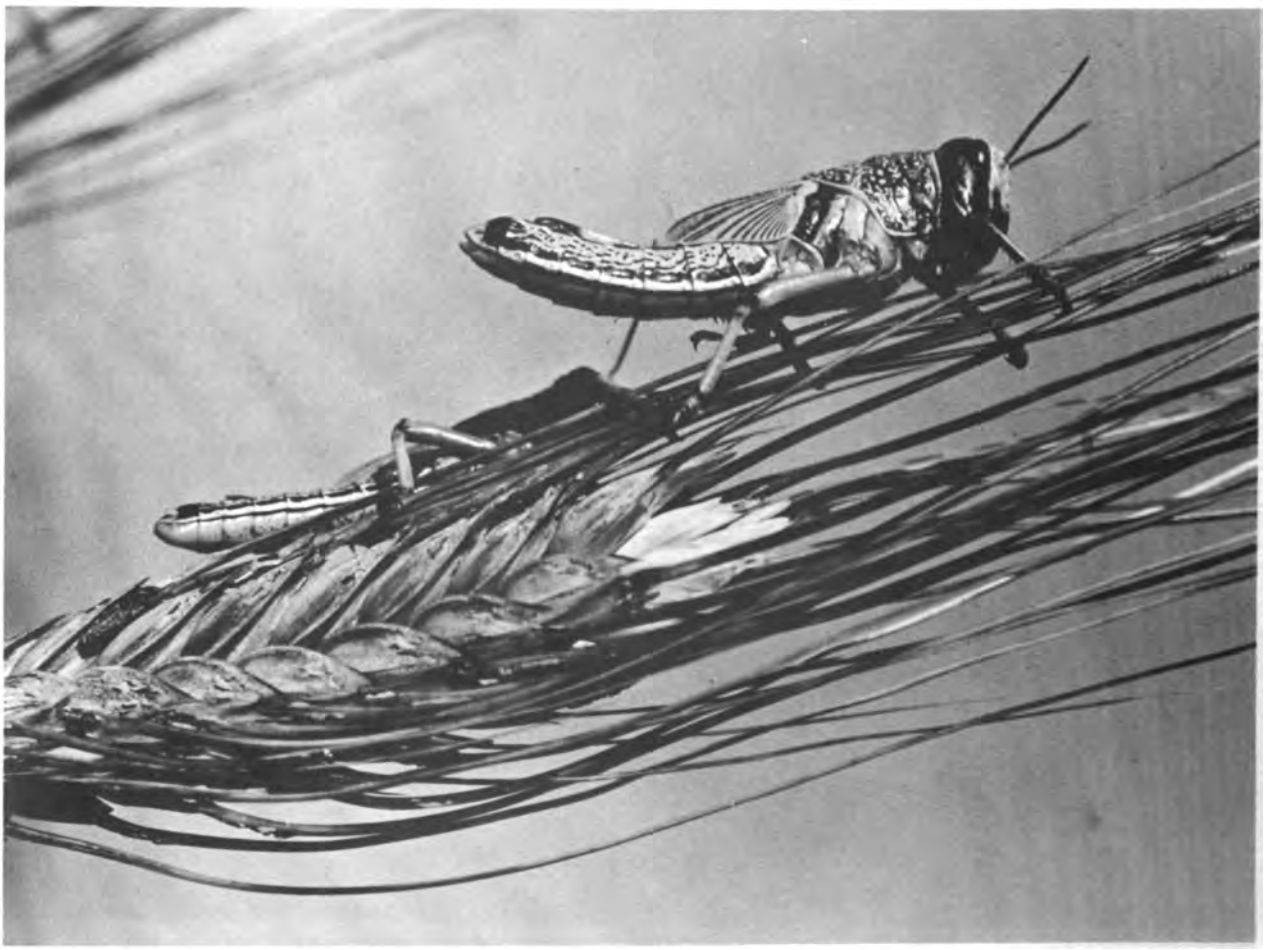
The government of Tunisia realized that the battle against the locust invasion must be quickly undertaken. Thus, it requested assistance from the United States, France, Libya and Morocco in lending them support in supplying aircraft for transportation of insecticides and equipment, spray planes and personnel. After appraising the situation in Tunisia, the Regional Insect Control Project office dispatched two spray planes and two tons of aldrin insecticide from Libya to Sfax. The spray planes went into action the day after their arrival on May 29, eighty kilometers west of Sfax.

In the area near Mezzouna and north of Regueb over 13,000 acres of wasteland, wheat and barley were airsprayed through June 9, using either aldrin or dieldrin at the rate of 2 ounces per acre on first to third instar hoppers. Almost perfect control resulted. From this locality the planes moved on to Bir Ali Ben Khalifa, then to La Feauconnerie, Tellil, Gebel Kardj, Trianga, Maaden and El Djem, spraying a total of 21,750 acres of olives, figs, some wheat and desert wasteland. Where late instar hoppers and young fledgling locusts were encountered, the insecticide dosage was increased to as much as 10 ounces per acre in some instances. At Tozeur, Degache, Kriz, El Hamma and Nefta Oases, 6,500 acres of date palms were airsprayed with dieldrin at the rate of 6 ounces per acre. Spraying operations ended on July 4, 1957. A total of approximately 41,500 acres were sprayed by the two Piper cub planes. Control was excellent and very few locusts escaped.

The ground support for the spray operation was provided by the Tunisian Ministry of Agriculture under the able direction of M. Zitouna. Cooperation was very good, and it was due to the good work of this official and his men that our entomologist and pilots were able to operate so smoothly and successfully in giving help to the government of Tunisia at a time when it was most urgently needed.

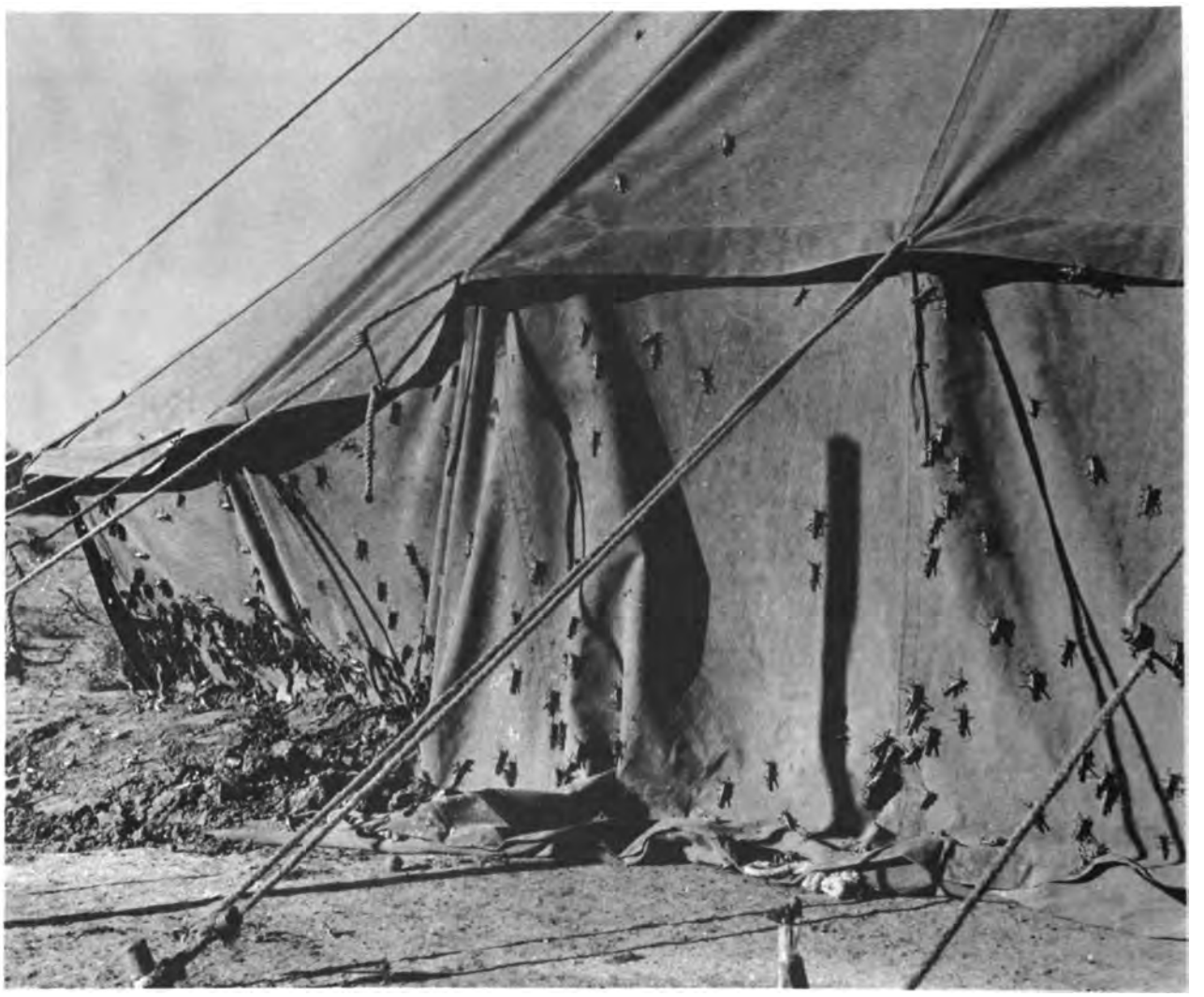


Tunisian locust officer (white shirt) in charge of spraying draws map in sand of area to be treated. He explains to the local governor of the province (dark robe) and land owner (white robe) and workers how the work is to be done.



Immature locusts or "hoppers" rest on a head of barley. It is in the nymphal stages, while the wings are still growing, that the hoppers are most vulnerable to insecticides.

This mature barley is infested by 3rd and 4th instar hoppers



Yet unable to fly, the immature locusts willingly climb anything within reach. Here they are seen climbing th sides of a tent at field headquarters.

The tank of the spraying airplane is loaded for the first trip of the day's work.

The 322nd Air Division of the United States Air Force stationed at Evreux, France was called into action in response to a request from the government of Tunisia. Sixteen of its large C-119's and one C-124 airlifted 220 tons of BHC insecticide from Agadir, Morocco to Tunis on June 27-30, 1957. The insecticide supplied by the French and Moroccan governments was transported directly to the areas of Tunisia where it could be used to the best advantage.

While this report was being compiled and edited, it was learned that the United States Operations Mission to Tunisia and the Tunisian Ministry of Agriculture were interested in a Regional Insect Control program for Tunisia. Following discussions in Tunis with Sadok Ed-Sousi, Chief of the Cabinet, and Mr. Marek of the Planning organization of the Ministry of Agriculture, and Elmer Starch, Agricultural Adviser, USOM, W. B. Mabee reports that on January 24, 1958, a special agreement was signed between the U. S. Operations Mission to Tunisia and the Regional Insect Control Project, Plant Pest Control Division, of the Agricultural Research Service, U. S. Department of Agriculture. This agreement, similar to those operating in other countries outlines the services to be performed by the USOM and the RICP and the objectives to be met in developing an insect control program for Tunisia.

Edward R. Millet, regional entomologist, attached to the USOM/ Lebanon arrived in Tunis, February 8, 1958, on a temporary assignment to make the initial survey of crops and insect pests, determine what problems are of greatest importance, and the need for supplies and equipment to meet these problems. In due course of time a full-time entomologist will be assigned to Tunisia by the Plant Pest Control Division.

TURKEY

At the request of the U. S. Operations Mission in Turkey, and the Turkish Ministry of Agriculture, the entomologist served as a consultant on the senn pest control and research program in that country during the months of April and May, 1957.

In the main this was a large control program against the destructive senn which yearly attacks the important wheat crop in the Firat (Euphrates) and Dicle (Tigris) river valleys in southeastern Turkey. Control was conducted on approximately 50,000 hectares (125,000 acres) largely by planes, hand dusters, and a few power dusters. Insecticides consisted of 10% DDT dust and 5-1/2% dipterex dust at the rate of 3 kilograms per decar (2-2/3 pounds actual DDT per acre; 1-1/2 pounds actual dipterex per acre). One decar equals 1/4 acre.

The biological research program of senn in Turkey is a year-round project consisting of life history studies, ecology, migration, hibernation, etc.

A supplementary research program of senn in Turkey and its control was also conducted during 1957, testing by aircraft application some 30 formulations of insecticides as emulsifiable concentrates and dusts.

The Regional Insect Control Project entomologist served in a consulting and advisory capacity in the varied phases of the program, helping set up the organization of control by aircraft and helping outline and activate the procedures for control research.

Apparently the overall program was a success. The entomologist returned to Lebanon before the completion of the year's program. The Turkish entomologists promised to send English translations of their final reports during the summer, but they have not yet been received.

FIELD PERSONNEL OF REGIONAL INSECT CONTROL PROJECT

1951 - 1957

Present Field Staff

Name	Designation	Country	Date employed
W. B. Mabee	Coordinator	Beirut	4-18-51
L. E. Gagnon	Adm. Assistant	Beirut	11-15-54
E. R. Millet	Entomologist	Beirut	4-3-55
F. P. Hubert	Plt. Quar. Spec.	Beirut	12-16-56
R. Q. Gardenhire	Entomologist	Iran	4-3-55
G. B. Riley	Entomologist	Iran	6-3-57
W. C. Kurtz	Entomologist	Ethiopia	1-3-57
D. D. Shallow	Entomologist	Afghanistan	10-6-56
Arthur Kaatz	Entomologist	Libya	11-15-55
W. O. Ridgway	Entomologist	Iraq	3-14-57
G. T. Brooks	Entomologist	Pakistan	4-23-57

Former Field Staff

R. B. Thrailkill	Entomologist	Beirut	3-4-52 to 4-13-55
E. McChesney	Adm. Officer	Beirut	9-23-52 to 9-25-54
J. W. Kelley, III	Entomologist	Lebanon	3-20-53 to 3-9-55
G. T. Bottger	Entomologist	Iran	6-25-53 to 6-27-55
W. C. Kurtz	Entomologist	Iran	3-22-53 to 12-26-56
W. R. Forsyth	Entomologist	Pakistan	3-29-53 to 3-24-55
G. E. Cavin	Entomologist	Pakistan	3-20-55 to 5-11-57
E. M. Livingstone	Entomologist	Jordan	10-23-53 to 10-23-55
G. H. Plumb	Entomologist	Afghanistan	6-21-55 to 1-20-56
W. O. Ridgway *	Entomologist	Ethiopia	12-23-52 to 1-12-57
D. D. Shallow	Entomologist	Iraq	5-21-54 to 6-5-56

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* Under contract with Oklahoma State College.

Results of Some of the More Important Insect Control Demonstrations

1951-1957

The following tables presented by country include data on some of the more important insect control demonstrations conducted in cooperation with the Departments of Plant Protection of the Ministries of Agriculture. A total of well over 500 demonstrations were carried out during the period 1951-1957. In many demonstrations not reported herein, no attempt was made to collect the actual percent control; in others the results were either poor or ineffective. All served a purpose in introducing new pesticides and demonstrating how and when to use them to best advantage.

Subsequent tables summarize various activities discussed in the text of this study.

As stated earlier in this report, the primary objective of the Regional Insect Control Project was to assist the cooperating governments to develop organization, technical competence, adequate facilities and equipment to strengthen their programs to meet major insect problems. In the early phases of the program U. S. planes and technicians were concentrated on efforts to control serious outbreaks of some of the more important pests. Large scale control measures were effected on the desert locust Schistocerca gregaria. Since that time individual countries have conducted large scale control operations with their own planes and pilots while U. S. technicians have served them largely in an advisory capacity.

IRAN

Data on Some of the More Important Insect Control Demonstrations, 1951-1957

Location & Date	Crop	Acreage & other Units	Insect	Dosage/Acre Actual Insecticide	Results or Percent Control
Khuzistan Bushire Ahwaz '51-'53	Misc. crops Range land	122,315	Schistocerca gregaria	2.1 - 2.6 ozs. aldrin	100% mortality in 4 days
Gombade-ghabus May, 1955	"	2,600	Dociostaurus maroccanus	2.0 ozs. aldrin	100% mortality
Varamin 4-28-1955	Wheat	113	Eurygaster integriceps	1 lb. malathion	85% after 72 hrs.
4-21-1955	Barley, wheat	85	"	1/2 lb. malathion	65-75% " " "
Varamin 5-10-1956	Barley	105	"	1 lb. malathion	83-94% adults
5-19-1956	Barley	44	"	1 lb. malathion	85-90% " 100% nymphs
Bam, 4/2/57	Barley	500	"	4 lbs. DDT	85-90%
Ardakan 5/10/55	Pistachio	25	Idiocerus stali	1/2 lb. malathion	95% after 6 days
5/10/55	"	25	" "	1 lb. malathion	100% " " "
Rafsenjan	"	122	" "	1/2 lb. malathion	100% single appli.
Apr. June '56	"	28	" "	1 lb. malathion	100% for season
Ahwaz, 6/8, 6/29/55	Cotton	62	Earias insulana	1/2 lb.endrin	85-95% 1/
6/29, 9/14/55	"	38	" "	1/2 lb. endrin	95-98% "
Hamidiyeh 9/14/56	"	16	Tetranychus atlanticus	4 ozs. systox	98% in 24 hours 100% after 9 days
Karaj 6-27/56	Sugar beet	6	Laphygma exigua	1 lb. malathion	95-98%
7-3-56	" "	25	"	1 lb. DDT	95-98%
8-7-56	Sweet clover	20	"	1 lb. DDT	98-100%
7-3-56	Sugar beet	62	Chaetocnema sp.	1 lb. DDT & 1/2 lb. malathion	95-98%
8-14-56	" "	2	Tetranychus sp.	2 ozs. systox	95-98% 3-4 weeks
8-30-56	" "	20	"	4 ozs. metasystox	95-99% " "
9-14-57	" "	12	"	1 lb. malathion	50-60% 2/
8-14-56	" "	4	Aphids	2 ozs. systox	95-100%
8-30-56	" "	20	"	4 ozs. metasystox	95-99%
3-19-57	Alfalfa	80	Hypera postica	4 ozs. dieldrin	95-98%
3-19-57	"	20	" "	1-1/2 lbs. toxaphene	95-98%
8-31-57	Sugar beet	12-1/2	Gnorimoschema ocellatella	1 lb. malathion	75-80%
9-7-57	" "	12-1/2	"	1 lb. malathion	85-95%
10-31-57	Apples & pears	400 trees	Mites & leaf-hoppers	15 cc. malathion per tree	95-98%

1/ Counts made after second application.

2/ Control of active stages only.

PAKISTAN

Data on Some of the More Important Insect Control Demonstrations, 1951-1957

Location & Date	Crop	Acreage or other Unit	Insect	Dosage/Acre Actual Insecticide	Results or Percent Control
11 localities 1951-1954	Range land Misc. crops	90,340 A.	Schistocerca gregaria	2-4 ozs. 60% aldrin	95-100%
Malir 4/21/55	Mango	50 A.	Idiocerus atkinsoni	1 lb. 75% W.P. DDT	65-70%
" "	"	50 A.	" "	3/4 lb. 50% malathion	65-70%
" "	"	-	" "	3 cc./gal. 50% malathion	96%
" "	"	-	" "	3 cc./gal. 25% DDT E.C.	98%
Punjab Apr.-June '54	Rice	-	Schoenobius incertellus	1 lb. 75% W. P. DDT	85-90%
East Pakistan 5 localities	Rice	325 A.	Pseudaletia unipuncta	2 ozs. endrin	85-88%
Narayanganj 11/7/57	Rice	30 A.	"	2 ozs. 19.5% E.C. endrin	90-95%
Mardan 4/21/55	Sugar cane	50 A.	Pyrilla perpusilla	10 cc. 20% endrin	70-75%
" 10/18/54	" "	550 A.	" "	4/5 pt. 50% malathion	80-84%
" 10/18/54	" "	2,125 A.	" "	.2 lb. endrin	75%
" 10/25/54	" "	125 A.	Aleurolobus barodensis	.2 lb. endrin	75-81%
" 10/25/54	" "	100 A.	"	4/5 pt. 50% malathion	90-94%
Dacca, May '56	Jute	800 A.	Burrowing crickets	BHC rice husk bait	60-70%
Charsadda Apr. 1956	Citrus	640 trees	Diaphorina citri	1-1/2 lbs. 75% DDT/100 gals.	60-65%
Hangu April,1956	Citrus	14 "	"	2 lbs. 75% DDT/100 gals.	80-90%
Peshawar 3/28/56	Peach	100 "	Sphenoptera lafertei	.03-.06% dieldrin-resin	95-100%
Peshawar 3/28/56	Peach	50 "	"	.15% malathion	95%
Hazara 6/56	Peach	2 A.	"	2 lbs. 75% DDT/100 gals.	45-50%
Hangu-Apr.'56	Peach	96 trees	"	2 lbs. 75% DDT	80-90%
Quetta 4/5/56	Peach	5 "	Aeolesthes sarta	methyl bromide	100%
Haripur Apr./56	Peach	5,094 "	Aphids-2 spp.	1-1/2 lbs. 75% DDT	70%
Peshawar 5/30/56	Corn	5 A.	Cutworms	2 lbs. aldrin	50%
Malir 11/12/57	Potato	20 A.	Empoasca devastans	2 cc./gal. 19-1/2% endrin	85-90%
Malir 10/2/56	Vegetables	-	Epilachna sp.	5-6 cc. 50% malathion	85-90%

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IRAQ

Data on Some of the More Important Insect Control Demonstrations, 1952-1957

Location & Date	Crop	Acreage or other Unit	Insect	Dosage/Acre Actual Insecticide	Results or Percent Control
10 localities May, 1952 Tib, Samah	Wheat and Range land	12,655 A.	Schistocerca gregaria	2 ozs. aldrin	95-100% after 48 hours
Khidr-al mai May, 1953	Desert land	7,430 A.	Schistocerca gregaria	3 ozs. aldrin	95-100% after 48 hours
Dora 4/22/55	Date palms	12 A.	Ommatissus binotatus 1/	40 lbs. 10% BHC as a dust	80-90%
Hilla 4/21/55	Date palms	12 A.	"	50% malathion 1:16	85%
Khadmain 6/19/54	Date palms	3-1/2 A.	"	50% W. P. DDT	80%
Baghdad, Kut Hilla & Diyellah Liwas 8-9-55	Cotton	2,293 A.	Tetranychus sp.	17 lbs. sulphur	80-90% Ministry Agri. operation
Baghdad 9/56	Cotton	100 A.	"	1 lb. a ramite	85-90%
Baghdad 9/56	Cotton	25 A.	"	3.2 ozs. systox	85-90%
Same locations June 10-18-56	Cotton	22,000 A.	Earias insulana	1/2 lb. endrin	90-95% (Ministry Operation)
Omar Bay, Dokan Rd., Kirkuk Rd.	Wheat	48 A.	Eurygaster integriceps 1/	1.2 lbs. parathion	90-95%
Kirkuk Rd.	Wheat	45 A.	"	5 lbs. 50% DDT	95-98% slow kill
Kirkuk Rd. 5-3-56 Mowan 5/5/56	Wheat	56 A.	"	1 lb. 50% EC chlorthion	95-98% quick kill
Salman Pak 2/23/56	Apple	10 trees	Eriosoma lanigerum	2 grs. malathion per 3 gals. water	Excellent by hand spray
Baghdad Liwa Feb.-Mar. 1956	"	140,000 trees	"	1 gr. parathion per gal.	Excellent by hand spray
Latafiya 3/29/56	Alfalfa	2 A.	Hypera postica	1-1/2 lbs. methoxychlor	Excellent by hand spray
Kadimain 3/13/56	Cowpeas	21 A.	Aphids	1:600 nicotine 1/2 lb. malathion	Excellent by hand spray

1/ Many additional demonstrations conducted against the date leafhopper and the Senn pest from 1954-1957 are not reported.

LEBANON

Data on Some of the More Important Insect Control Demonstrations, 1954-1957.

Location & Date	Crop	Acreage & other Units	Insect	Dosage/Acre Actual Insecticide	Results or Percent Control
Hamanna, Aley Jezzine 5/56	Apple	3 A.	Carpocapsa pomonella	.8 lb. 50% malathion	Excellent 1/
Kfar Selwan Apr.Aug.'57	Apple	1,500 trees	" , red mite and aphids	1 lb. malathion	"
"	Apple	1,500 trees	" "	1/4 lb parathion	"
Janeh, Browmana 8/9/56	"	1 A.	Eriosoma lanigerum	6-8 lb. 20% endrin	95-98%
Kfar Selwan 3/20/57	"	3,000 trees	Red mite	4 lbs. lime sulfur	80-85%
Choueifat 7-9-1957	Olive	75 A.	Dacus oleae	1/2 lb. diazinon	92%
Choueifat Mammeltain 8-10-1957	Olive	2-1/2 A.	Dacus oleae	2 lbs. yeast hyrdrolysate, 8 lbs. malathion	47-73%
Aldoun, 5/9/56	Citrus	1 A.	Icerya purchasi	1.3 lb. 15% dieldrin	95-98%
Batroun 6/21/56	"	2 A.	Aonidiella aurantii	2 lbs. 50% malathion 4 lbs. lime sulphur	90-95%
Batroun 6/21/56	"	2 A.	Phyllocoptruta oleivora	4 lbs. lime sulphur 2 lbs. 50% malathion	90-95%
Barasket 3/6/56	Wheat	-	Syringopais temperatella	1/2 lb. 50% malathion	75-80%
Adloun 5/11/56	Nursery stock	5 A.	Gryllotalpa sp. Melolontha sp.	2 lbs. aldrin	90-95%
Adloun 5/22/56	Dairy barns	-	Musca domestica	15% dieldrin 1:100	Good control
Terbol 6/23/56	Poplar	1/2 A.	Capnodis spp.	2 lb. 60% aldrin	98% , solution applied to base of trees
Bekaa, 1954	Alfalfa	5 A.	Noctuid larvae	1/2 lb. malathion	95-100%
Beirut Mar. 1957	Ornamentals	2 A.	Soil insects Ants	3 lb. dieldrin	90%
Beirut Mar. 1057	Ornamentals	2 A.	Misc. aphids Scale insects	.8 lb. malathion Volck oil -1-80	85-90%

1/ Six applications each at 15 day intervals.

LIBYA

Data on Some of the More Important Insect Control Demonstrations, 1955-1957.

Location & Date	Crop	Acreage or Other Unit	Insect	Dosage/Acre Actual Insecticide	Results or Percent Control
Castel Bonito Azizia, Beni Ulid, Zavia June 1955	Orchards Pastures Misc. crops	12,600 A.	Schistocerca gregaria	2.5 ozs. aldrin	95-100%
Suk el Giuma 4/24/56	Melons	2 A.	Melolontha melolontha	2 lbs. aldrin	95-100%
Suk el Giuma 4/26/56	Tobacco	15 A.	"	2 lbs aldrin	95-100%
Zavia 6/2/56	Peanuts	5 A.	"	2 lbs. aldrin	95-100%
Barce Cyrenaica 3/2/56	Barley Flax, wheat Peas	121 A.	Mustard and thistle weeds	1/5 to 1/4 lb. 2, 4-D	75-100% mustard 0-75% thistle control
Sidi Mesri 1/5/57	Vegetables	0.1 A.	Nematodes	15 lbs. Ethylene dibromide	30%
Sidi Mesri 3/30/57	Vegetables	400 sq. ft.	Nematodes	1 gal.: 400 sq. ft. Sod. methyl dithiocarbamate	Satisfactory
Tripoli 5/11/56	Vegetables	0.1 A.	Brachytrupes megacephalus	2 lbs aldrin	95-100%
Castel Benito 7/27/56	Peanuts	10 A.	Brachytrupes megacephalus	4% BHC bran bait	90%
Tagiura 4/15/57	Tobacco	15 A.	Agrotis ypsilon	2 lbs. aldrin	95-100%
Tagiura 4/15/57	Tobacco	10 A.	Agrotis ypsilon	1 lb. DDT	80-85%
Tripoli 5/19/57	Citrus	25 trees	Chrysomphalus dictyospermi & Parlatoria zizyphus	1 oz. malathion/gal.	95-100% after 2 months
Wadi Caam 7/21/57	Corn & Sorghum	67 A.	Sesamia cretica	3.9 ozs. aldrin	45-50%

AFGHANISTAN

Data on Some of the More Important Insect Control Demonstrations, 1957

Location & Date	Crop	Acreage Or Other Unit	Insect	Dosage/Acre Actual Insecticide	Results or Percent Control
Jalalabad April 8	Sugar cane	0.1	Sugarcane borer	20 cc./Gal. 75% chlordane dipped seed stalks	75-80%
Marja Shamalon August 7	Cotton	0.1	Earias insulana	1/2 lb. 19.6% endrin	80-85%
Sorx Ab July 2	Legumes	0.1	Locustids	20 ozs. 60% aldrin/3 gals.	55-60%
Borg July 3	Legumes	0.1	Locustids	50% BHC - 1:250 road dust	75-80%
July 3	Legumes	0.1	Locustids	50 cc. aldrin/gal. per 100 lbs. bran = 10 A.	95-100%
Lashkar August 6	Alfalfa	0.1	Pseudaletia unipuncta	2 lbs. DDT	85-90%
August 6	Alfalfa	0.1	"	8 ozs. malathion	90-95%
Kabul August 1	Cauliflower	0.1	Aphids	50 cc. 50% malathion per 3 gals.	95-100%
Kalat May 21	Almond	125 A.	Malacosoma sp.	1 lb. malathion/2 gal. aerial application	95-100%
Ghazni May 24	Almond	50 A.	Malacosoma sp.	"	95-100%
Jalalabad April 11	Citrus	20 trees	Dialeurodes sp.	30 cc. 50% malathion per 5 gal.	95-100%
Kabul Sept. 13	Pistachio nuts	100 lbs.	Plodia interpunctella	30 cc. 50% malathion per 3 gal.	95-100%
Kabul June 18	Pasture	40 A.	Boophilus sp.	1-1/2 lbs. 25% E. C. DDT per 2 gals.	75-80%

ETHIOPIA

Data on some of the More Important Insect Control Demonstrations, 1953-1957.

Location and Date	Crop	Acreage or Other Unit	Insect	Dosage/Acre Actual Insecticide	Results or Percent Control
Errer-gota Dega Medo Bishoftu, etc. 1953-1954	Bush Rangeland	10,000 A.	Schistocerca gregaria	2-1/2 ozs. aldrin	95-98%
Arrusi 3/12/56	Sheep	1,116 head	Boophilus sp. Sarcoptes sp.	0.5% toxaphene and 0.025% BHC	Complete control
Entoto 4/25/56	Sheep	1,500 head	Melophagus ovinus	0.5% toxaphene and 0.025% lindane	Complete control
Addis Ababa 5/9/57	Compound	1A.	Fleas	5 lbs. DDT	90-95%
Bishoftu 2/13/57	Citrus	4 trees	Misc. scale insects	0.1% malathion	95-100%
Nazareth 3/3/57	Citrus	30 trees	Misc. scale insects	0.1% malathion	95-100%
Hollata 11/15-21/56	Grapes	12 A.	Flea beetles	2% W. P. DDT	85-90%
Bishoftu 2/13/57	Peppers	.01 A.	Noctuid larvae	250 grs. 20% gamma BHC/100 lbs. bran	95-100%
Ficce, Akaki Feb. 1957	Crucifers	.26 A.	Cabbage worms	.1% malathion	95-100%
Addis Ababa 4/24/57	Poultry house	532 sq. ft.	Chicken lice	1% malathion	100% in 48 hours
Ficce 2/15/57	Poultry house	1,000 sq. ft.	Chicken lice	5% DDT and 0.1% malathion	98-100%
Addis Ababa 6/12/57	Cabbage	.01 A.	Cabbage worms	5% DDT. W. P.	85-95%
Addis Ababa 11/20/57	Lawns	.57 A.	Ants	4.5 lbs. dieldrin	95% after 24 hours

Expenditures of Regional Insect Control
Project Including Locust Control Program
1951 - 1957 1/

Year	No. of Countries	Expenditures
1951	3	$567,000
1952	6	427,000
1953	6	336,000
1954	7	254,582
1955	9	334,412
1956	10	245,647
1957	10	300,000 estimated

1/ Prior to July 1, 1954, funds were administered by the Foreign Operations Administration.

Financial Support Provided to Overall Cooperative Plant Protection Programs, 1951-1957

Country	Date Begun	USOM Support	Local Funds
Iran	1951	$ 1,101,650	$ 10,070,000
India	1951	728,180	279,000
Pakistan	1951	877,000	4,672,217
Iraq 1/	1952	16,650	3,390,000
Jordan	1952	75,000	Unknown
Ethiopia	1952	133,110	212,966
Lebanon	1954	130,000	232,000
Libya	1955	4,000	338,000
Afghanistan	1955	5,500	20,000
		3,071,090	19,214,183

1/ The Iraq Development Board has allocated approximately an additional $1,000,000 for Insect Survey for an indefinite period.

Number of Personnel Trained 1951-1957

Country	Date Begun	Trainees sent to United States	Spray Pilots Trained	Airplane Mechanics Trained	Technicians Trained Locally
Iran	1951	9	49	45	47
India	1951	3	3	-	15
Pakistan	1951	5	9	4	30
Iraq	1952	3	18	12	46
Jordan	1952	2	-	-	12
Ethiopia	1952	2	-	-	55
Lebanon	1954	3	-	-	12
Libya	1955	-	4	-	-
Afghanistan	1955	-	-	4	73
Egypt	1956	3	-	-	-
		30	83	65	290

Number of Demonstrations, Crops, Insect Species and Acreage Treated In RICP Cooperative Programs 1951-1957.

Country	Date Begun	Locusts		Other Insects		Kinds of Crops	Species of Insects
		No. Dem.	Acreage	No. Dem.	Acreage		
Iran	1951	40	142,686	95	19,320	11	21
India	1951	15	8,700	-	-	4	1
Pakistan	1951	21	90,340	94	20,267	17	20
Iraq	1952	21	28,718	80	4,998	8	16
Jordan	1952	1	750	37	15,000	11	20
Ethiopia	1952	13	10,126	55 1/	117	11	27
Lebanon	1954	-	-	66	686	12	16
Libya	1955	5	13,900	20 2/	350	12	10
Afghanistan	1955	-	-	15	474	11	10
Egypt	1956	-	-	-	Survey	-	-
Tunisia	1957	7	41,500	-	-	5	1
		123	335,430	462	61,617		

Total Control Demonstrations	585
Total Acreage in Demonstrations	397,047
Total Number of Crops	37
Total Species of Insects	85

1/ Includes livestock pest control.

2/ Includes weed control demonstrations.

Pest Control Equipment Imported by U. S. Operations Missions and Ministries of Agriculture, 1951-57.

Country	Date Begun	Spray Planes 1/	Trucks 2/	Power Applicators	Hand Applicators	Other
Iran	1951	39	68	24	100	11
India 3/	1951	3	128	185	5,154	-
Pakistan	1951	20	56	525	10,183	630 4/
Iraq	1952	21	46	52	450	2
Jordan	1952	-	3	8	3,000	-
Ethiopia	1952	10	7	2	300	-
Lebanon	1954	-	6	286	476	-
Libya	1955	-	12	43	155	-
Afghanistan	1955	-	-	4	8	-
Total		93	326	1,129	19,826	643

1/ Owned and operated by local Ministries of Agriculture.

2/ Includes all motor vehicles, trucks, tank trucks, jeeps and landrovers.

3/ Figures for years 1951-1954 only.

4/ Includes 600 hand seed treators.

Importation of Agricultural Pesticides in Tons 1/

1951 - 1957

Country	Date Begun	By United States Government(USOM)	By Host Government 2/
Iran	1951	30.28	765.50
India 3/	1951	2.00	18.00
Pakistan	1951	43.13	2,218.05
Iraq	1952	6.76	540.25
Jordan 4/	1952	4.00	11.25
Ethiopia	1952	2.30	22.30
Lebanon	1954	1.85	52.75
Libya	1955	30.50	9.70
Afghanistan	1955	8.61	10.00
Total		129.43 tons	3,647.80 tons

1/ In 1957, fifty kinds of pesticides imported represented a tonnage of 1,693 tons purchased by the host governments and 70 tons purchased from U. S. Operation Mission funds.

2/ Ministry of Agriculture.

3/ Figures not available after 1951.

4/ Figures not available after 1955.

Preliminary List of the Insects and Mites of Economic Importance.

The species listed below represent some of the more important pests encountered in the Middle East countries. Most of these have been identified or confirmed by specialists in the Entomology Research Division, ARS, U. S. Department of Agriculture. Because of the interest shown by host countries in the development of insect surveys, it is believed that this preliminary list of species will serve a useful purpose.

Scientific Name	Common Name	Host	Country
Acanthoscelides obtectus	bean weevil	legume seed	Libya
Aceria sheldoni	citrus bud mite	citrus	Libya
Acherontia atropos	a hawk moth	olive	Libya
Acheta domestica	house cricket	grain oil seeds	Pakistan
Acronicta sp. near psi	a noctuid larva	apple	Lebanon
Aeolesthes sarta	Quetta borer	peach apple	Pakistan
Agonoscena targioni	pistachio psyllid	pistachio	Iran
Agrotis ypsilon	black cutworm	tobacco cucumber egg plant	Afghanistan Ethiopia Lebanon, Libya
Alcides frenatus	mango fruit borer	mango	Pakistan
Aleurocanthus woglumi	citrus blackfly	citrus mango	Pakistan Iran
Aleurolobus barodensis	sugarcane whitefly	sugarcane	Pakistan

Amitermes vilis	a drywood termite	wood	Iran
Anacanthotermes vagus septentrionalis	a drywood termite	railroad ties	Iran
Anagasta kuhniella	Mediterranean flour moth	flour	Libya
Anarsia lineatella	peach twig borer	peach almonds apricots	Lebanon Iran
Anoecia corni	an aphid	Trifolium sp.	Iran
Anomis sabulifera	jute semi-looper	jute	Pakistan
Anopheles algeriensis	a mosquito	man	Libya
Anopheles coustani tenebrosis	a mosquito	man	Libya
Anopheles multicolor	a mosquito	man	Libya
Anthophila pariana	a moth	apple	Iran
Aonidiella aurantii	California red scale	citrus	Afghanistan Lebanon
Aonidiella orientalis	oriental yellow scale	citrus	Iran
Aonidiella citrina	yellow scale	prune	Iran
Aphis fabae	bean aphid	beans beets	Lebanon Iran, Iraq Libya
Aphis gossypii	cotton aphid	cotton	Ethiopia Iran Afghanistan Lebanon

Aphis medicaginis	cowpea aphid	alfalfa	Iran
Aphis pomi	apple aphid	apple citrus	Lebanon Libya
Aporia crataegi	a pierid butterfly	apple	Lebanon
Argas persicus	fowl tick	poultry	Ethiopia
Argyria sticticraspis	a sugarcane borer	sugar-cane	Pakistan
Aspidiotus destructor	coconut scale	mango	Pakistan
Aspidiotus hederae	oleander scale	olive	Libya
Aspidiotus hedericola	an ivy scale	English ivy	Lebanon
Aspidiotus perniciosus	San Jose scale	apple peach plum	Pakistan
Athalia colibri	turnip sawfly	radish	Iran
Attagenus gloriosae	a dermestid	flour	Libya
Aulacophora foveicollis	red pumpkin beetle	melon	Pakistan Lebanon Afghanistan
Batocera rufomaculata	fig borer	fig	Pakistan
Batocera sp.	mango stem borer	mango	Pakistan
Batrachedra amydraula	Hashof of dates	date palm	Iraq

Bemisia tabaci	cotton whitefly	cotton	Pakistan
Blattella germanica	German cockroach	household	Lebanon
Boophilus sp.	a cattle tick	cattle	Ethiopia Afghanistan
Brachycaudus pruni	peach curly aphid	peach	Pakistan
Brachytrupes megacephalus	mole cricket	peanuts	Libya
Bradysia sp.	a fly	potato	Iran
Brevicoryne brassicae	cabbage aphid	cabbage	Iran Libya
Bruchus lentis	a weevil	lentils	Iran
Bruchus pisorum	pea weevil	legume seed	Libya Lebanon
Bryobia praetiosa	clover mite	apple	Iran
Cacoecimorpha pronubana	a tortricid leafworm	olive	Libya
Campylomma diversicornis	a plant bug	cotton	Iran
Capnodis cariosa	a flatheaded borer	poplar	Lebanon
Capnodis miliaris	a flatheaded borer	poplar	Lebanon
Capnodis porosa	a flatheaded borer	poplar	Lebanon
Capnodis tenebriosus	a flatheaded borer	apple	Lebanon Jordan

Carpophilus hemipterus	dried fruit beetle	dates	Libya
Carpophilus sp.	a nitidulid beetle	dates	Iran
Carpocapsa pomonella	codling moth	apple pear	Pakistan, Iraq Afghanistan Lebanon, Iran
Ceratitis capitata	Mediterranean fruit fly	citrus	Libya, Jordan Lebanon
Ceroplastes rusci	fig wax scale	citrus	Libya, Jordan Lebanon
Ceroplastes sinensis	Chinese wax scale	citrus	Iran
Chaetocnema sp.	flea beetles	sugar beet	Iran
Chilo tumidicostalis	a sugarcane borer	sugarcane	Pakistan
Chilo zonellus	maize borer	corn	Pakistan
Chionaspis asiatica	a diaspid scale	plum	Iran
Chloropsalta ziridissima	a cicada	grapes	Lebanon
Chrotogonus sp.	a grasshopper	cotton	Pakistan
Chrysomphalus aonidum	Florida red scale	citrus banana	Lebanon
Chrysomphalus dictyospermi	dictyospermum scale	olive citrus	Libya Iran
Cimex lectularis	bed bug	man	Ethiopia Lebanon
Circulifer opacipennis	a sesame leafhopper	sesame	Iran
Cleonus sp. prob. punctiventris	a beet weevil	beet	Iran

Coccus hesperidum	soft scale	citrus	Libya
Colias sp.	an alfalfa caterpillar	alfalfa	Iran
Dacus oleae	olive fly	olive	Libya, Iran Jordan, Lebanon
Dacus zonatus	peach fruit fly	peach	Pakistan
Diacrisia obliqua	jute hairy catepillar	rice	Pakistan
Dialeurodes citri	citrus white fly	citrus	Pakistan
Diaphorina citri	citrus psylla	citrus	Pakistan
Dicladispa armigera	rice hispa	rice	Pakistan
Dociostaurus moroccanus	Moroccan locust	various crops	Iran
Dolycoris baccarum	a pentatomid	turnip	Iran
Drosicha stebbingi	mango mealybug	mango	Pakistan
Dysdercus cingulatus	cotton stainer	cotton	Afghanistan
Earias fabia	spotted bollworm	cotton	Pakistan
Earias insulana	spiny bollworm	cotton	Iran, Jordan Pakistan
Empoasca devastans	cotton leafhopper	cotton potato	Afghanistan Pakistan
Epilachna chrysomelina	melon beetle	melon eggplant	Iran, Libya

Eriosoma lanigerum	woolly apple aphid	apple	Jordan, Iraq Lebanon
Eublemma olivacea	brinjal leaf roller	eggplant	Pakistan
Eumerus sp.	a syrphid fly	sugar beet	Iran
Euphyllura olivina	olive psylla	olive	Libya
Euproctis signata	hairy caterpillar	apple	Pakistan
Eurydema ornatum	a pentatomid	turnip	Iran
Eurydema ventrale	a pentatomid	cabbage	Iran
Eurygaster integriceps	senn pest	wheat barley	Lebanon, Iran Jordan, Iraq Afghanistan
Eurytoma amygdali	almond nut borer	almond	Iran
Eurytoma pistaciae	pistachio nut borer	pistachio	Iran
Eurytoma plotnikovi	pistachio nut borer	pistachio	Iran
Eutetranychus banksi	a spider mite	citrus	Iran
Forda sp.	pistachio aphid	pistachio	Iran
Galerucella xanthomelaena	elm leaf beetle	elm	Iran
Getulasphis bupleuri	a scale	olive	Libya
Gnathocerus cornutus	broad-horned flour beetle	grains	Libya

Gnorimoschema ocellatella	a sugar-beet crown borer	beet	Iran
Gnorimoschema operculella	potato tuber worm	potato tobacco	Lebanon Libya
Gryllotalpa prob. gryllotalpa	a mole cricket	peanuts various crops	Lebanon Libya
Gryllotalpa sp.	a mole cricket	tobacco	Iran
Heliothis armigera	cotton bollworm	cotton tobacco	Ethiopia Iran
Hellula undalis	a cabbage webworm	turnip	Iran
Helopeltis theivora	a tea mirid	tea	E. Pakistan
Hieroglyphus banian	rice grasshopper	rice	Pakistan
Hippobosca longipennis	dog louse fly	dog	Tunisia
Holcostethus sphacelatus	a pentatomid	turnips	Iran
Hyalomma dromedarii	camel tick	camel	Libya
Hylemya cilicrura	seed-corn maggot	corn	Ethiopia
Hylemya sp.	a seed maggot	beans	Iran
Hypera postica	alfalfa weevil	alfalfa	Iran, Iraq Lebanon
Hyponomeuta sp. prob. padellus	lesser ermine moth	almond	Afghanistan
Icerya purchasi	cottony-cushion scale	citrus	Lebanon Libya

Idiocerus atkinsoni	mango leaf-hopper	mango	Pakistan
Idiocerus stali	pistachio leafhopper	pistachio	Iran
Laemophloeus pusilus	flat grain beetle	cereals	Libya
Lampides boeticus (near or)	a lycaenid	cowpeas	Iran
Laphygma exigua	beet armyworm	alfalfa cotton potato sweet-clover	Libya Iran
Latheticus oryzae	a tenebrionid	cereals	Libya
Lecanium coryli	a soft scale	peach plum	Pakistan
Lepidosaphes beckii	purple scale	citrus	Libya Iran
Lepisma saccharina	silverfish	household	Lebanon
Leucania loreyi	a noctuid	corn sorghum	Iran
Leucinodes orbonalis	brinjal borer	egg-plant	Pakistan
Leucoptera coffeella	coffee leaf miner	coffee	Ethiopia
Liothrips oleae	olive thrips	olive	Libya
Lixus sp.	a weevil	sugar-beet	Iran
Lobesia botrana	grapeberry moth	grapes	Lebanon
Lygus sp.	a plant bug	peach	Ethiopia

Macrosiphum granarium	English grain aphid	wheat	Pakistan
Macrosiphum pisi	pea aphid	alfalfa	Lebanon Afghanistan
Malacosoma sp.	almond webworm	almond	Afghanistan
Marseulia sp.	short-winged beetle	wheat	Ethiopia
Megastigmus pistachiae	pistachio nut borer	pistachio	Iran
Meloidogyne incognita acrita	a root knot nematode	tomato squash beans	Libya
Meloidogyne javanica	a root knot nematode	squash	Libya
Melolontha melolontha	a white grub	olive tobacco watermelon	Libya Lebanon
Melophagus ovinus	sheep-ked	sheep	Ethiopia
Microtermes spp.	termites	cotton	Pakistan
Myiopardalis pardalina	Baluchistan melon fly	melon	Lebanon Iran
Myllocercus undecimpustulatus maculosus	cotton gray weevil	cotton	Pakistan
Myzus persicae	green peach aphid	peach plum pear	Pakistan
Myzocallidium riehmi	an aphid	sweet-clover	Iran
Neomargarodes hamelii	ground pearl	wheat	Iran
Nepticula promisa	a gelechiid leaf miner	pistachio	Iran

Nezara viridula	southern green stink bug	cabbage	Ethiopia
Nilotaspis halli	Hall scale	citrus	Libya
Ocneria terebynthina	a tussock moth	pistachio	Iran
Odontotermes obesus	a termite	sugarcane	Pakistan
Ommatissus binotatus	date fulgorid	date	Iran Iraq
Oligonychus afrasiaticus	date spider mite	date	Iran Iraq
Orosius albicinctus	a sesame leafhopper	sesame	Iran
Orzyaephilus surinamensis	saw-toothed grain beetle	grains	Libya
Oxycarenus laetus	a lygaeid bug	cotton	Afghanistan
Oxypleurites maxwelli	olive leaf mite	olive	Libya
Palpita unionalis	a pyralid leafworm	olive	Libya
Panonychus citri	citrus red mite	citrus	Lebanon Iran
Panonychus ulmi	European red mite	apple	Lebanon
Papilio demoleus	lemon butterfly	citrus	Iran
Papilio demoleus v. demodocus	orange-dog	citrus	Ethiopia
Parlatoria blanchardi	parlatoria date scale	date palm	Iran

Parlatoria oleae	olive scale	olive	Libya
Parlatoria pergandii	chaff scale	citrus	Libya
Parlatoria zizyphus	black parlatoria scale	citrus	Libya
Pectinophora gossypiella	pink bollworm	cotton	Afghanistan Pakistan Iran
Pectinophora marvella	a podworm	hollyhock	Iran
Pegomya hyoscyami	spinach leaf miner	sugar beet spinach	Iran
Philippia oleae	an olive scale	olive	Libya Iran
Phonapate frontalis	a bostrichid	date palm	Iraq
Phyllocnistis citrella	citrus leaf miner	citrus	Pakistan
Phyllocoptruta oleivora	citrus rust mite	citrus	Lebanon Iran
Phyllotreta near atra	a flea beetle	radish turnip	Iran
Phloeotribus scarabaeoides	a bark beetle	olive	Lebanon Libya
Phylloxera vitifoliae	grape phylloxera	grape	Lebanon
Pieris brassicae	cabbageworm	cabbage	Pakistan Lebanon Iran
Pieris rapae	cabbage caterpillar	crucifers	Iran, Libya Lebanon Afghanistan Jordan

Platyedra vilella	cotton stem borer	cotton	Iran
Plodia interpunctella	Indian-meal moth	cereals	Libya
Plutella maculipennis	diamondback moth	cabbage turnip	Iran
Pollinia pollini	Pollini scale	olive	Libya
Polyphylla fullo	a white grub	olive tobacco	Lebanon
Porthetria dispar	gypsy moth	forest-trees	Iran
Prays oleellus	olive moth	olive	Lebanon
Prodenia litura	Egyptian cottonworm	alfalfa	Iran
Pseudococcus citri	citrus mealybug	citrus	Libya
Pseudaletia unipuncta	armyworm	rice	Pakistan, Iran Afghanistan Jordan
Pseudococcus maritimus	grape mealybug	citrus	Iran
Psoroptes equi v. ovis	scab mite	sheep	Ethiopia
Pterochlorus persicae	an aphid	almond peach apricot	Lebanon Iran
Pyrrhocoris apterus	a cotton stainer	Hibiscus sp.	Turkey
Pulvinaria aurantii	orange pulvinaria scale	citrus	Iran
Pulvinaria floccifera	yew scale	citrus	Iran

Pyralis farinalis	meal moth	stored grains	Libya
Pyrausta nubilalis	European corn borer	corn	Lebanon
Pyrilla perpusilla	sugarcane pyrilla	sugarcane	Pakistan
Pyroderces sp.	a moth	cotton seed	Iran
Recurvaria pistacicola	gelechiid nut borer	pistachio	Iran
Rhagoletis cerasi	cherry fruit fly	cherry	Iran
Rhipophorothrips cruentatus	grapevine thrips	grape	Pakistan
Rhynchites auratus	cherry curculio	cherries	Iran
Rhyzopertha dominica	lesser grain borer	wheat	Pakistan
Rhipicephalus sp.	a tick		Ethiopia
Saissetia oleae	black scale	olive	Libya
Saperda sp.	poplar borer	poplar	Afghanistan
Scatopse fuscipes	a black fly	sugar beet	Iran
Scirpophaga nivella	sugarcane borer	sugarcane	Pakistan
Schistocerca gregaria	desert locust	various crops	Iran, Iraq Afghanistan India, Libya Ethiopia Jordan Pakistan

Schoenobius incertulas	rice stem borer	rice	Pakistan
Scirtothrips dorsalis	a thrips	tomato pepper	Pakistan
Scolytus sp.	a scolytid borer	sweet-cherry	Iran
Sesamia cretica	Durra stem borer	corn sorghum sugarcane	Ethiopia Iran Libya
Silba pendula	a black fly	pepper	Libya
Silba sp.	a black fly	figs	Libya
Simaethis nemorana	fig moth	figs	Libya
Sitophilus oryzae	rice weevil	grains	Libya Iran
Sitotroga cerealella	Angoumois grain moth	stored-grains	Libya
Sogata furcifera	rice delphacid	rice	Pakistan
Sparganothis pilleriana	grape moth	grape	Iran
Sphenoptera lafertei	flatheaded borer	sweet-cherry peach	Pakistan Iran
Stephanitis pyri	a lace bug	apple pear	Lebanon
Supella supellectilium	brown-banded roach		Lebanon
Sylepta derogata	cotton leaf roller	cotton	Pakistan
Synanthedon sp.	a peach tree borer	peach	Afghanistan
Syringopais temperatella	wheat leaf miner	wheat	Lebanon Jordan

Taeniothrips inconsequens	pear thrips	pear	Lebanon
Taragama sp.	a tent caterpillar	buckthorn	Iran
Tenebroides mauritanicus	cadelle	cereals	Libya
Tenuipalpus granati	a mite	grape	Iran
Tenuipalpus n. sp. (In press)	a mite	pome-granate	Iran
Tetranychus atlanticus	strawberry spider mite	cotton	Ethiopia, Iraq Jordan, Iran Lebanon
Tetranychus sp. (near atlanticus)	a spider mite	grape	Iran
Tetranychus sp.	a spider mite	tea	Pakistan
Therioaphis maculata	spotted alfalfa aphid	alfalfa	Ethiopia Iran, Iraq
Thrips tabaci	onion thrips	tobacco sugar beet	Iran
Tribolium castaneum	red flower beetle	wheat barley	Libya
Tribolium confusum	confused flower beetle	wheat barley	Libya
Trogoderma granarium	khapra beetle	wheat barley	Iran
Trichoplusia ni	cabbage looper	potato	Iran
Unaspis euonymi	euonymus scale	euonymus	Turkey
Vespa orientalis	a hornet	grape	Afghanistan

Xanthodes graellsii	a noctuid	cotton	Iran
Zeuzera pyrina	leopard moth	apple	Lebanon Jordan, Iran Libya
Zonabris oleae	blister beetle	olive	Libya

SPECIAL PROJECT
REGIONAL INSECT CONTROL PROJECT

SPECIAL AGREEMENT
BETWEEN
THE FOREIGN OPERATIONS ADMINISTRATION *
AND
THE AGRICULTURAL RESEARCH SERVICE
OF
THE UNITED STATES DEPARTMENT OF AGRICULTURE

I. Authority.

In accordance with Sections III, VI and Appendix I of the General Memorandum of Agreement between the U. S. Department of Agriculture and the Foreign Operations Administration, dated February 18, 1954, certain services, hereinafter specified, in connection with the planning and implementation of insect control programs administered by the Foreign Operations Administration (hereinafter referred to as the FOA), in cooperation with Governments of Near East, Africa and South Asian Countries (NEA) will be performed by the Agricultural Research Service, U. S. Department of Agriculture, hereinafter known as the ARS.

II. Objectives.

1. Maintain facilities and continue needed services for a coordinated locust control program in the NEA Regions.

2. Broaden the scope of insect control activities of the Regional Project to assist the U. S. Operations Missions (hereinafter referred to as the USOM) in their efforts to aid the Governments of cooperating countries in development of practical control programs against other major insects and supervise and direct such segments of these programs as may be agreed upon.

3. Aid the USOM in developing a coordinated approach to the insect control programs in the various countries.

4. Train nationals in insect control techniques.

5. Coordinate FOA insect control activities where such activities involve cooperation with international and other organizations.

* Now International Cooperation Administration (ICA)

III. Responsibilities of the Foreign Operations Administration.

The FOA will be responsible for the review and approval of program plans, evaluation of the overall work under the project to determine its effectiveness in relation to country and regional objectives of the Technical Cooperation Program, and clearance and approval of personnel recruited by the ARS against a staffing pattern referred to below in Article VII.

IV. Responsibilities of the ARS.

Within the ARS, the Plant Pest Control Branch (hereinafter known as the Branch) will be the functional agency responsible for implementing the Regional Insect Control Project. The Branch will operate in full cooperation with FOA/W and the USOM. Within the limits of funds made available for this project, the Branch will plan and conduct approved programs (submitted to FOA/W for approval in the form of project outlines and annual plans of work) deemed appropriate under technical cooperation agreements and designed to

(1) Evaluate the locust problem at all times within the areas of operation in order to present a true picture of locust infestations for the benefit of United States participation, advising FOA at Washington and Directors of USOM currently of the country and regional situation.

(2) Complete commitments to various cooperating countries made under the Regional Locust Control Program with respect to the training of pilots, etc.

(3) Continue cooperative demonstrational locust control operations to the extent that such operations are deemed necessary to hold the locust in check or to meet outbreaks which threaten the agriculture of countries requesting locust control assistance and entering into appropriate agreements with the FOA providing for such assistance.

(4) Explore various entomological problems for usefulness and adaptation of control operations in an effort to aid the governments of cooperating countries to initiate or improve insect control services.

(5) Demonstrate or cooperate in demonstrating improved insect control practices, which may include use of hand-and-engine-powered ground equipment, aircraft, biological controls and any other appropriate material, equipment or practices in the control of insect pests of major importance.

(6) Develop on an individual country basis organized pest control programs which will provide for international cooperation when outbreaks of locusts or other major pests require regional treatment for best results.

(7) Employ safe and reliable methods in the handling, preparation, and application of insecticides to safeguard against hazards to man and animal.

(8) Maintain an adequate survey and reporting service for appraising major insect problems, including locusts, for use of cooperating countries and organizations.

(9) Assist local personnel in developing leadership in applied entomology through on-the-job training.

Also, the Branch will

(1) Prepare monthly and annual reports, covering fully the financial and technical aspects of the project, and such special reports as may be agreed upon from time to time.

(2) Recruit and place on its rolls project personnel under an organizational pattern subject to approval and clearance by FOA.

(3) Specify the types and amounts of equipment and materials, the pilots and aircraft services required to properly carry out approved programs, and procure or contract for and maintain such equipment, materials and services as are chargeable to the Regional Insect Control Project.

(4) Organize training facilities, in cooperation with USOM officials in the areas of operations, as arranged by USOM officials, to acquaint them with modern methods of survey and control, and to train local responsible insect control technicians with the objective of enabling each cooperating country effectively to operate its own program.

V. Country Project Responsibilities.

The planning, execution, and operation of insect control programs in each cooperating country will be carried on in close cooperation between the Director of the USOM, hereinafter referred to as the Director, and the Coordinator of the Regional Insect Control Project (hereinafter referred to as the Coordinator) (or their designees), to insure the proper implementation of all control operations.

1.(a) The Director of each USOM, in accordance with paragraph III, Section C(2) of the General Memorandum of Agreement, usually acting through his Chief Agriculturist, will have the over-all responsibility for the conduct of the cooperative project in the country to which he is assigned.

(b) The Coordinator, acting under the direct authority of the Chief of the Branch, will be responsible to the Branch for the conduct of the program in all its technical aspects.

2.(a) The Director will be responsible for over-all development of the Mission's insect control program and integrating the program with other USOM activities within the cooperating country.

(b) The Coordinator will be responsible for assistance and advice to the USOM's in planning the insect control activities under the country program, in order that they may be coordinated with similar work of other organizations within the country, and with international insect control programs.

3.(a) The Director will be responsible for assignment of USOM personnel, equipment and supplies to this cooperative project.

(b) The Coordinator will be responsible for the allocation of regional personnel, equipment and supplies to individual country cooperative programs.

4.(a) The Director will be responsible for the over-all operation of the program within the cooperating country and for determining the relationships with local authorities and institutions.

(b) The Coordinator will supervise and direct within the framework of the program approved by the Director, such segments of the insect control programs as are mutually agreed upon.

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5.(a) The Director will be responsible for the over-all organization, financing and conduct of training programs within the cooperating country.

(b) The Coordinator will advise and assist within the framework established in each country in the selection of local personnel for training programs in insect control in the United States and will supervise such cooperative insect control training in each country as is mutually agreed upon by the Director and the Coordinator.

VI. Regional Project Responsibilities.

1. The Coordinator will cooperate with the Food and Agriculture Organization authorities and coordinate project activities with the Director of the USOM in each of the countries in which the program operates.

2. The Coordinator will continue to serve as United States Member of the Food and Agriculture Organization Technical Advisory Committee on Locust Control.

3. The Coordinator will direct the movement of regional project personnel, planes, and equipment, to best fit the needs of the over-all program where outbreaks of locust or other major insects require emergency action or to facilitate the survey and reporting service, in accordance with plans approved by FOA/W.

4. The Coordinator, or his designee, will be responsible for management, use, control, maintenance and operation of all materials, equipment and supplies assigned to the Regional Insect Control Project, including aircraft, motor vehicles, spray and dusting equipment, insecticides, etc.

VII. Implementation of the Project.

1. The ARS will implement the project through the Plant Pest Control Branch. Liaison with the field will be made by an Entomologist and Secretary in Washington. Any procurement, personnel, accounting or budget activities that are required to be handled in the United States will be done in ARS through the liaison officer in the Branch and such other authorities in ARS and other agencies in the Department of Agriculture as

are appropriate. Required administrative services at U. S. Embassies in the countries concerned will be continued as in the past.

The field staff of the Regional Locust Control Project now headquartered at Beirut, Lebanon, consists of the Director, an Administrative Assistant, and three Entomologists. The Regional Locust Control Program, initiated on a regional basis in Fiscal Year 1952, obtained nine Piper Cub airplanes equipped with the necessary instruments, spraying gear, and essential parts. These planes have been maintained and operated by pilots and mechanics provided under a commercial contract where needed in the Near East, South Asia and Africa. The disposition of planes, pilots and entomologists for project operations in the field has been and continues to be subject to the discretion of the project director, who is hereby designated as the Coordinator of the Regional Insect Control Project.

2. The Regional Insect Control Project, which supplants the Regional Locust Control Program, provides for a broadened program to include project activities relating to the control of other insect pests of economic importance, as well as the locust. It will place more emphasis on entomological problems of individual countries while working directly with USOM personnel.

3. The Regional Insect Control Project will operate on a regional basis where locusts or other insect pests of international importance are involved, utilizing funds appropriated to the area allocated to the ARS to cover expenditures for the regional project activities. All contracts, equipment and supplies now assigned or chargeable to the Regional Locust Control Program are hereby transferred to the Regional Insect Control Project. All equipment, etc. (subject to inventory) that have been or will be acquired with funds of the Regional Locust Control Program or Regional Insect Control Project, will remain the property of the FOA, and upon completion of project operations or termination of this agreement will be disposed of as directed by the FOA.

4. Personnel of the Regional Insect Control Project will be subject to security clearance by the FOA. ARS agrees to remove personnel under this agreement

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requested by FOA. Entomologists now assigned to USOM staffs in Jordan, Iran, Iraq and Ethiopia are to be transferred to ARS rolls at the earliest feasible date. Entomologists recruited for additional assignments in the field of Agriculture, with approval of FOA/W will be placed on the rolls of the ARS, and field assignments will be made by the ARS with the concurrence of FOA.

Administrative arrangements governing ARS personnel assigned to overseas positions, or traveling in foreign countries in connection with the implementation of this project, shall be in accordance with the provisions of Appendix I to the Memorandum of Agreement of February 18, 1954, between the Department of Agriculture and the FOA.

5. The Director, Office of Food and Agriculture, FOA, or his designee, shall be responsible for overall activities relating to progress evaluation and contract adherence (Section III C, 2 (d) of the Memorandum of Agreement of February 18, 1954).

VIII. Financial Provisions.

In consideration of the services to be performed under the Regional Insect Project by the ARS, FOA/W will advance to the ARS funds on an annual basis to cover all costs of furnishing services under this agreement. Documents transferring funds will indicate the purpose for which the funds are made available and the amount of each appropriation chargeable. The financing of this project will be in accordance with the provisions of Section III a. and VI of the Memorandum of Agreement of February 18, 1954. It is mutually agreed that $410,000 will be made available by FOA/W for the performance of work under this project by the ARS for the performance of work under this project by the ARS for the Fiscal Year 1955. Budget amounts for subsequent years will be agreed upon prior to such years.

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Upon liquidation of the project, FOA will transfer to ARS such funds as may be required to carry out the liquidation of the project.

IX. Executive Approval

This agreement will be effective July 1, 1954 and, subject to availability of funds, continue in force until June 30, 1956. This agreement may be extended or amended by Memoranda of Agreement, and may be terminated by either cooperating agency on 90 days notice.

Approved:

Foreign Operations Administration

/S/ E. N. Holmgreen

Director, Office of Food and Agriculture

June 8, 1954

(Date)

U. S. Department of Agriculture

/S/ B. T. Shaw

Administrator, Agricultural Research Service

June 15, 1954

(Date)

Concurred in

C. E. Whipple

Administrator, Foreign Agricultural Service

June 16, 1954

(Date)

Note: Amendments have extended the above original project agreement with only a few minor changes.

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