WAR AGAINST LOCUSTS IN INDIA

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IN a previous issue of *Current Science* (Vol. X, No. 11, 1941), the writer briefly described how the current cycle of the Desert Locust started in India during 1940 and gave a brief account of progress of the outbreak up to September 1941. The present note deals with the locust movements and breeding after this period, the control organizations of the Government of India and of various Provinces and States, and India's locust activities in other countries.

LOCUST SITUATION

1941-42: Monsoon breeding in Sind-Rajputana continued up to the end of November 1941, the locust completing two generations. The local swarms which started developing about the middle of September invaded, in addition to whole of Rajputana and Sind, western parts of the Central Provinces, southern and western districts of Rajputana, Punjab and North-West Frontier Province. During October they also went as far as Belgaum in Bombay Presidency (Lat. 15° 44′, Long. 74° 43′) and Bellary in Madras (Lat. 15° 10′, Long. 76° 52′). In the beginning of October, they started flying in the westerly direction. The majority of the swarms that overwintered in India perished due to excessive cold in the Punjab and United Provinces hills and a few survivors left India *via* Upper Baluchistan during January-February 1942. After this, no swarm activity was reported from any part of India and accordingly there was no gregarious breeding during spring or early summer.

1942-43: Though there was no spring or early summer breeding in Baluchistan, but in Iran, Oman (Arabia) and other 'winter-rainfall' countries heavy breeding took place. The resultant swarms from these extra-Indian tracts commenced reaching India early in June, the earliest swarm being noted at Panjgur (Mekran-Baluchistan) on 5th. They passed over Sind and western Rajputana without egg-laying as at that time rainfall had not yet started, reached as far south as Vasna near Baroda (Lat. 23° 15′, Long. 80° 34′) on 8th July.

Soon after the middle of June, rainfall started and eggs were laid over extensive areas in eastern Rajputana, northern parts of Central India, States of Gwalior, Alwar, etc., and south-western districts of the United Provinces.

Breeding was very light in western Rajputana and in Tharpakar district of Sind. In other areas active breeding continued during July-August and energetic control operations were carried out in most parts of Rajputana except a few tracts where some hopper-bands escaped destruction and the swarm formation commenced during the first half of August These invaded the western parts of Rajputana, Sind and Bahawalpur State. Moreover, about this time, further incursion of large number of individual locusts from west was observed and these got intermixed with the home-developed swarms. By this time western half of Rajputana, Sind and Bahawalpur had also received good rainfall and heavy breeding started in these tracts. During the second generation breeding in all areas good conrol work was carried out except in Jaisalmer and some adjoining areas, thus giving rise to a few swarms. This second brood of home-developed swarms mostly flew towards north and north-east and some flew towards west. Of the latter, about half a dozen crossed the Indian frontiers into Iran and Arabia.

A small number of swarms overwintered in northern Punjab and western Sind. Towards the end of January (1943) some swarms appeared in western Mekran (Baluchistan) and laid eggs. Oviposition also commenced in the northern Punjab in the end of January and in Sind during February. Due to thorough surveys and prompt control work hoppers were not allowed to become adults in all the areas excepting in some parts of the Punjab where a number of hopper bands escaped destruction and the resultant swarms penetrated the North-West Frontier Province and led to late spring breeding. In Mekran the pest was almost completely destroyed by the end of March but unfortunately several fresh swarms came from Persian side early in April and spread over whole of Baluchistan and laid eggs. Second generation breeding followed in western Mekran, Jhalawan, Kharan and Chagai District but the situation was soon brought under control.

1943-44: Whereas some of the immigrant swarms referred to above, that came from Persia during April, remained in western Baluchistan and laid eggs, others flew eastward and reached Kachhi and Bahawalpur areas by the end of April. During May and June they penetrated into Sind-Rajputana, western India, U.P. and Bihar, the southernmost locality reached by them was Bilaspur (Lat. 22° 07′, Long. 82° 13′) in the Central Provinces and the easternmost was Patna (Lat. 25° 41′, Long. 85° 17′). Since breeding continued in Persia up to the middle of July and a large number of hoppers escaped destruction in that country India was invaded by a second wave in the end of May and subsequent incursion of swarms was continued up to August. To some extent they were supplemented by swarms which developed in northern Punjab and N.W.F.P. in the past spring referred to above.

Localised rainfall was received after the middle of June followed by locust breeding in some parts of Jodhpur, Bikaner, Jaisalmer and Jaipur. There was widespread heavy rainfall in Sind-Rajputana beginning from 10th July

and this was followed by heavy breeding in whole of Tharparkar district, northern and western parts of Jodhpur, almost whole of Jaisalmer and Bikaner, Shekhawati desert of Jaipur and southern parts of Bahawalpur State. Some semi-desert districts of Jaipur State and Hissar district of Punjab were also affected. Towards the end of August and early in September further oviposition took place in north-eastern Bikaner, Shekhawati desert of Jaipur, Ferozepur, Hissar and Ludhiana districts, Bahawalpur, Patiala, Nabha and Loharu States in the Punjab. Energetic control work was carried out and in almost all cases the hoppers were destroyed before they passed the middle age. In spite of the fact that the breeding was very heavy, only about half a dozen small swarms developed in whole of north-west India. Most of these flew towards south-west and reached the sea coast between Karachi and Cutch State. None penetrated into Mekran or crossed the Indian frontiers. No swarm was observed in any part of India after the 12th November and presumably they got scattered or perished into the sea. Anticipating that some locust swarms in India will escape destruction and migrate to Persia in the autumn, the Middle East Anti-Locust Unit had established an organization at the Indo-Persian border to destroy such swarms. But our work in India had been so thorough that the organization had to be disbanded without coming across any swarm flying from Indian side.

In view of the foregoing, it was hoped that the locust cycle had been brought to an end in the Eastern Zone (India, Persia, E. Arabia, Iraq, etc.), by the successful control measures adopted by the Indian anti-locust organisations. Though there was no breeding during early spring (1944) in Persia or Oman active breeding had been in progress in Sudan, East Africa and Coasts of Red Sea throughout the past winter and spring. Some foreign experts assured us that India will not be invaded this year. Unfortunately, however, India was once again unexpectedly invaded by swarms from Arabia during last March-April (1944). As soil moisture conditions were very suitable in Baluchistan, they laid eggs over extensive areas in Mekran, Jhalawan, Kharan, Chagai, Lasbela and Chaman areas of the Province. In Sind also breeding is in progress in western parts, *viz.*, Dadu and Larkana Districts. The local Administrations under the supervision of Central Government staff are effectively dealing with the situation in Baluchistan and many localities have been cleared of hoppers. It is hoped that swarms will not be allowed to develop from any part except perhaps a few inaccessible valleys in Baluchistan. On the other hand, it may be mentioned that breeding is also in progress in Arabia, Persia and Afghanistan and from the available information it appears that swarms will develop from these regions and invade India in the summer.* It is feared that during the coming monsoon we shall have once again to deal with a serious situation, therefore, we have accordingly made preparations for a large-scale campaign during the next monsoon weather.

Anti-Locust Organizations in India

As described in the previous communication (*Current Science*, Vol. X, No. 11, 1941), the present locust cycle started in 1940, a very critical time because of the war, and thus the food supply both for the troops and civil population even otherwise difficult became very serious. To fight this pest the Government of India immediately took steps. States being independent and Provinces autonomous in agricultural matters, every Province and State is responsible for the destruction of crop pests including locusts in its jurisdiction. In the past, anti-locust measures were independently undertaken by the Provinces and States affected with the result that often good work carried out by one Administration was undone through the neglect of its neighbours. This was specially so because the territories which contain the largest permanent desert breeding grounds are naturally poor agriculturally and, therefore, have little inducement to incur heavy expenditure on locust destruction Appreciating the all-India, in fact the international importance of locust, the Central Government is maintaining since 1939 a permanent Locust Warning Organization in the charge of their Imperial Entomologist at New Delhi, with field staff posted at strategic points all over north-west India, right up to the western borders of Baluchistan. This organization continually surveys the permanent breeding areas, even when the locust is in the solitary phase, to study the rise in the population of the pest, and issue periodic warnings and forecasts about locust invasions. When the present outbreak started, this organization was suitably expanded and in addition to carrying out locust intelligence work was made responsible for directing and co-ordinating the anti-locust work of various Provinces and States in which the locust might be breeding. By the autumn of 1941 some larger measures of co-ordination of work in various Provinces and States had become necessary. Locust conferences of all the Province and States in North-west India were held in October 1941 and April 1942 and a co-ordinated locust control scheme was approvid and put in operation in May 1942. According to this scheme the cost of locust destruction in the permanent desert breeding areas was to be shared by the respective Governments of the territories that were liable to locust attacks according to an agreed formula. The participating Governments also bear the cost of special technical staff, who are stationed in various Provinces and States containing the permanent breeding grounds and who advise local authorities regarding suitable control methods to be adopted and with whose assistance the Imperial Entomologist co-ordinates control work in India as a whole. This Co-ordinated Scheme proved very successful in 1942 campaign, was renewed in 1943 with the consent of the Provinces and States concerned and has recently been again extended for the 1944-45 season. The Government of India appointed a Deputy Locust Entomologist in 1943 to ensure proper supervision of control operations and the Locust Warning Organization has been

* As anticipated swarms have invaded several States of Rajputana by the end of June.

further strengthened recently by the appointment of another Deputy Locust Entomologist.

INDIAN LOCUST ACTIVITIES IN OTHER COUNTRIES

It has already been made clear that India, Persia and Arabia are inter-dependent in regard to locust activities, since swarms developed in one country invade others. In view of this, at the request of the Middle East Supply Centre, the Government of India sent delegations of Indian entomologists for control work in Persia during 1941-42 and 1942-43, and in Arabia during 1942-43 and 1943-44. Indian troops were also employed for locust work in Persia during 1942-43 and 1943-44 where they were mainly responsible for carrying out timely control work. At the request of the Middle East Anti-Locust Unit, the Government of India took over the responsibility for carrying out control work in Persian Mekhran in February 1944. The organization is also working under the direct control of the Imperial Entomologist at New Delhi.

In addition to sending control missions described above, the Imperial Entomologist was deputed to attend an International Locust Conference at Tehran in October 1942 and again at Cairo in July 1943 where important decisions were taken with regard to the organization and technique of locust control work on international basis. To carry out well-organized work in Persia an International Control Committee was established at Tehran early in 1943 and a Government of India's representative (Superintendent, Locust Substation, Karachi) resided at Tehran for about three months during 1943 and two months during 1944, taking active part in the deliberations of the International Committee.

UNIVERSITY COLLEGE OF TECHNOLOGY, MADRAS

FACILITIES for higher technological studies in the Madras area will henceforth be available at the new University College of Technology, which is for the present located as a temporary measure in the Government College of Engineering, Guindy. The inauguration of this College is well timed as there will be a great demand for chemical engineers and technologists in the post-war era of industrial reconstructions and developments in this country. Considerable progress has already been made under the auspices of the B.S.I.R. in various branches of Chemical Industries and a number of new processes have been developed in recent years. In order to preserve this progress, and to develop further processes in a keenly competitive world in the post-war years specialised chemical engineering talent and technological grounding and skill will be in great demand. It is, therefore, a happy augury that the Madras University has pushed forward with its arrangements for contributing to meet these very essential national demands. Parallel courses in Chemical Engineering, Leather Technology, Textile Chemistry, Electrochemistry, Fermentation Technology, etc., are under contemplation, but a beginning has been made this year with the Chemical Engineering course, through the kind courtesy of the Government of Madras, who have made available to the University the vast resources of the engineering laboratories and the workshop facilities at their College of Engineering, Guindy. The College is promised a substantial financial aid by way of a munificent grant from Dr. Rm. Alagappa Chettiar, of more than Rs. 3 lakhs non-recurring, and an annual recurring grant of Rs. 25,000. The Government of Madras are also giving generous grants towards the building, equipment and maintenance of the College which has been so boldly ventured upon by the University in these difficult times from out of its own funds.

A good start has already been made with the appointment of highly qualified staff. Dr. D R. Nanjee, who comes out shortly to India after nearly twenty years of experience in England, both in the Universities and as a Consulting Chemist, will be the Professor and Director of the College, while Dr. M. A. Govinda Rau, who has successfully organised and conducted the courses in Chemical Engineering at The Indian Institute of Science, Bangalore, will be the Reader in charge of Chemical Engineering.

Great credit is due to the learned and enthusiastic Vice-Chancellor of the University, Dewan Bahadur Dr. A. L. Mudaliar, for it was he who proposed the scheme nearly three years ago and should now be justly most happy at these successful results of his tireless efforts. We congratulate Dr. A. L. Mudaliar and the University on the occasion of the Inauguration of the new College by His Excellency the Governor on the 28th of this month. The honorary degree of Doctor of Laws will be conferred upon Dr. Rm. Alagappa Chettiar at a special Convocation held on the same occasion.