



SCHEDULE OF PAPERS CIRCULATED TO THE MEMBERS OF
THE LOCUST COMMITTEE.

1. Reports of the Locust Research Entomologist, Assistant Locust Research Entomologist and Report by Mr. M. Afzal Husain, Entomologist to Government, Punjab. ;
2. Statement showing estimated expenditure of the Locust research scheme from December 1930 to 31st March 1935. ;
3. Notes on the subjects on the agenda. ;
4. Report on the proceedings of the Third International Locust Conference held in London in September 1934.
5. A note by Dr. K. R. Karandikar on the "Biometrical studies on the desert locust".
6. Application from the Government of Bombay for a grant of Rs. 56,795 spread over a period of five years for research on the study of the Deccan Wingless grass hopper (*Colemania Sphenarioidis*).
7. Two papers entitled (1) "Studies on the Ecology of the Desert Locust in Southern Baluchistan" and (2) "A general description of the Black Hoppers of the Desert Locust (*Schistocerca Gregaria Forsk*)" by Dr. K. R. Karandikar, Assistant Locust Research Entomologist.
8. Representations from Messrs. Mohd. Ramzan, Chandra Prakash and Shanti Lal for the grant of an increased rate of annual increment.

Agenda for the sixth meeting of the Locust Committee appointed by the Imperial Council of Agricultural Research, held on the 17th and 18th January 1935.

1. (a) Report on the work done by the Locust Research staff under the Locust Research Entomologist to the Imperial Council of Agricultural Research during the year 1934. ;
(b) Third annual report of the Locust Research Field Laboratory, Panshi, for the year 1934. ;
(c) Proposals for the continuance of the Locust Research Scheme.
2. Report of the Desert Locust Investigation at Lyallpur for the year 1934 and proposals for its continuance.
3. Report on the proceedings of the Third International Locust Conference held in London in September 1934. ;
4. Biometrical studies on the desert locust.
5. Application from the Government of Bombay for a grant of Rs. 56,795 spread over a period of five years for research on the study of the Deccan Wingless grass hopper (*Colemania Sphenarioidis*).
6. (a) Question of Publication of Dr. Karandikar's paper "A general description of the Black Hoppers of the Desert Locust".
(b) Question of publication of Dr. Karandikar's paper "Studies on the Ecology of the Desert Locust (*Schistocerca Gragariaphase Solitaria*) in Southern Baluchistan". ;
7. Representations from Messrs. Mohd. Ramzan, Chandra Prakash and Shanti Lal for the grant of an increased rate of annual increment.

PROCEEDINGS OF THE SIXTH MEETING OF LOCUST COMMITTEE OF THE IMPERIAL COUNCIL OF AGRICULTURAL RESEARCH HELD AT NEW DELHI ON THURSDAY, THE 17TH JANUARY 1935.

The following were present:—

1. Diwan Bahadur Sir T. VIJAYARAGHAVACHARYA, *Chairman.*
2. Mr. B. C. BURT.]
3. Mr. AFZAL HUSAIN, Government Entomologist, Punjab.
4. Dr. H. S. PRUTHI, Imperial Entomologist.
5. Mr. P. B. RICHARDS, Government Entomologist, U. P.
6. Mr. H. R. STEWART, Director of Agriculture, Punjab.
7. Rao Sahib Y. RAMCHANDRA RAO, Locust Research Entomologist.
Rai Bahadur MALIK CHARAN DAS, *Secretary.*

2. The meeting lasted from 2-30 P.M. to 4-50 P.M.

3. *Report on work done by the Locust Research staff under the Locust Research Entomologist to the Imperial Council of Agricultural Research during the year 1934.* [Subject No. 1 (a) of the Agenda.]

The Locust Research Entomologist was asked to introduce his report on the work done by the Locust Research staff during the year 1934. In introducing the subject, Rao Sahib Ramchandra Rao referred to the maps prepared by him showing the places where locust surveys had been made and explained the various items of work which had been carried out during the year under report. It was then decided that the best way of considering the report would be for the Chairman to go through it page by page and invite remarks on any points that might occur to members.

Page 1.—No remarks.

Page 2.—III.—*Survey Work.*—Mr. Richards made the general remark that in his opinion the information so far collected was inconclusive and said that the system of carrying out extensive surveys in large areas would not provide an answer to the question whether there were permanent breeding grounds or not. In his opinion it would be better to concentrate attention on intensive surveys in a few selected areas. Rao Sahib Ramchandra Rao agreed and said that that was why he had proposed to confine work during the coming year to the desert areas of Rajputana, Sind and Mekran and to omit the greater part of Sind and Bahawalpore from this work. Mr. Burt was of the opinion that we had done enough for general survey work and that we must now concentrate work on places where locust had been found in some years. Mr. Richards pointed that the object was to ascertain whether there were really permanent breeding grounds in any of the tracts under survey or if locusts were gradually dying out. It was also necessary to determine whether the locusts appearing in a certain place were being bred there regularly or if they had moved in from other areas. This was generally accepted. After a general discussion the Committee agreed that extensive surveys should be given up during the year 1935-36 and that intensive survey work should be carried out in selected areas.

Page 3.—Rao Sahib Ramchandra Rao was requested to prepare a table showing the places which were kept under observation during the years 1931, 1932, 1933 and 1934 for consideration by the Committee on January 18th.

Page 4—Results of the survey work in 1934.—Mr. Richards referred to the last sentence in paragraph 1 on this page where it is stated that "A more efficient direction and supervision of the Turbat fieldman's work should have been productive of definite information on this subject", and asked the Locust Research Entomologist in what respect the direction and supervision had not been efficient. Rao Sahib Ramchandra Rao explained that Mirza Ahmad Ali Khan, who was the Locust Research Assistant at Karachi in charge of survey work in Mekran, was offered a post in Kalat State which he originally accepted but subsequently declined. He had performed two survey tours in Mekran in February and May 1934, but as he was awaiting receipt of final orders he could not attend to the supervision of the survey work that was going on there during June and July. Secondly, when the Locust Research Entomologist went on deputation to England in August 1934 he left certain instructions in regard to the way in which survey work should be carried out but unfortunately these instructions were not fully followed by his substitute. It was ultimately decided that this point should be looked into by the Vice-Chairman. It was also suggested that if the Locust Research Entomologist's report is to be furnished to any other person than the Locust Committee such modifications as may be found necessary on this point should be carried out. Dr. Pruthi enquired how much touring had been done by the Locust Research Entomologist during the year under report. After some discussion Mr. Burt pointed out that the Locust Research Entomologist was not expected to tour continuously and the most that he could do was to test the work of his staff occasionally. It was the job of the Locust Research Assistants to look after the fieldmen on survey work and that the Locust Research Entomologist must be largely in Karachi. It was pointed out that both Mr. Kesho Das Waweja and Mr. D. R. Bhatia had done their work very well and it was only Mirza Ahmad Ali Khan who did not do his work properly. In this connection it was realised that Mirza Ahmad Ali Khan was originally appointed for semi-executive work in Baluchistan because he was familiar with the conditions there and as extensive survey work had then to be done. Now that it had been decided to discontinue extensive surveys Mirza Ahmad Ali Khan could be replaced by a technical assistant.

Page 5—Number of generations in the year.—There was some discussion in regard to the use of the word 'definitely' in the second sentence of this paragraph which reads as follows:—"In the Lasbela area, breeding occurred in summer and was definitely limited to a single generation, which appears to have been the case in general in Bahawalpore, Dera Ghazi Khan and Thar-Parkar". Mr. Afzal Husain thought that it was not possible to say that the breeding was definitely limited to a single generation and expressed the view that it would be better to use some word such as 'probable' instead of 'definitely'. The sense of the meeting was that that was a matter for the Locust Research Entomologist whose conclusion it was, since it depended on the data on which Rao Sahib Ramchandra Rao had prepared his report.

Pages 6, 7 and 8.—No remarks.

Page 9—Item 12.—In regard to the swarm of locusts referred to against this item, Mr. Richards said that whether the swarm actually appeared or not was doubtful and therefore suggested that the words “was reported to have” should be inserted before the word “appeared”. The Committee agreed. It was also decided to change the word ‘heavy’ into ‘considerable’ in line 8 from bottom on this page.

Page 10—Study of old records.—Mr. Afzal Husain said that, in his opinion, there was no point in continuing this work because the information which was available on the subject in past records was not likely to be very useful in connection with our future work. On the other hand, Mr. Burt thought that these old records were important, especially reports of calamities that had occurred and it would be useful to have them on permanent record and that they should be properly analysed. The Chairman added that they had historical value and should be preserved. It was explained that two compiling assistants on Rs. 77 each per month were employed on this work and the Committee agreed to their continuance for the coming year. It was also decided that the words “Punjab Government Entomologist” in item 8 under ‘Compilation of information extracted in previous years’ should be changed to the (then) Locust Research Entomologist’ as this was Mr. Afzal Husain’s appointment at that date.

Pages 11 and 12.—Reference was made to the statement in the paragraph headed ‘Data from the Bombay Government Gazette—1850 to 1933 to the reference to the Bombay locust (*Patanga succincta*) and the proposal that, since this locust has proved a menace to agriculture in Peninsular India it may be advisable to have its breeding area properly investigated during its present phase of minimum activity. The question was raised whether the Council should undertake such an investigation during the coming year. Rao Sahib Ramchandra Rao was asked whether he could give any idea of the work involved. He replied that he had no detailed information about the breeding grounds in that area but they probably stretched all along the Western Ghats and was unable to give any idea of the work involved. The Chairman thought that had there been anything serious about this locust in Bombay, it would no doubt have been reported to them by the Government of Bombay. Mr. Richards thought that if no action was taken and if there was an invasion later on the Committee would be charged with having neglected the work. It was pointed out in discussion that Kolhapur and neighbourhood was always mentioned in the reports and might be an important centre. Ultimately it was decided that the Locust Research Entomologist be asked to put up definite proposals on the subject, after examining details.

Pages 13 and 14.—No remarks. |

Pages 15 and 16—Conclusions and suggestions for future work.—It was decided to consider this work along with the future programme of work tomorrow when the Locust Research Entomologist should put up a detailed programme of work in connection with his proposal for the establishment of a small Central Laboratory at Karachi. |

4. The meeting then adjourned till 10-30 A.M. on Friday, the 18th January 1935.

CHARAN DAS,

Secretary.

NEW DELHI;

The 17th January 1935.

Proceedings of the sixth meeting of the Locust Committee of the Imperial Council of Agricultural Research held at New Delhi on Friday, the 18th January 1935.

The following were present:—

1. Diwan Bahadur Sir T. VIJAYARAGHAVACHARYA, *Chairman.*
2. Mr. B. C. BURT.
3. Mr. AFZAL HUSAIN.
4. Dr. H. S. PRUTHI.
5. Mr. P. B. RICHARDS.
6. Mr. H. R. STEWART.
7. Rao Sahib Y. RAMACHANDRA RAO.

Rai Bahadur Malik Charan Das, *Secretary.*

2. The meeting lasted from 10-30 A.M. to 2-45 P.M.

3. *Third annual report of the Locust Research Field Laboratory, Pasni, for the year 1934 (Subject No. 1 (b) of the Agenda).*—The Chairman took up the consideration of the report page by page and Dr. Karandikar, Assistant Locust Research Entomologist, was called to the meeting to explain any points that might be raised by the members.

Pages 1-5.—In answer to the questions put by Mr. Richards Dr. Karandikar explained that the survey work was conducted by the fieldmen either on foot or on a camel. When on foot the fieldmen would beat the bushes with long sticks and if they observed any locusts they would record the fact in their diary. If the fieldmen were on the camel they would get down when they came across any good scrub and would walk on foot beating the bushes. The diaries of the fieldmen were inspected by him on their return to headquarters. Mr. Richards referred to the remark 'No locusts were observed' in the tours on pages 1, 2 and 3 and enquired whether it could safely be concluded from this that there were not locusts in those areas. Dr. Karandikar replied that he could not say this. All that was meant was that locusts were not observed in those areas at the time the tours were made. He (Dr. Karandikar) was not in a position to say whether the survey work was efficiently conducted, as he only relied on the facts given to him by the fieldmen. Mr. Richards questioned whether any conclusions as to the comparative locust population in different areas and at different times could be drawn from the results of the survey tours. Some standard method for observations was necessary which would give a more reliable picture of the actual locust position.

Mr. Burt referred to the survey tours made by the Ambagh fieldman (page 5 of the report) and enquired the distances between the places shown in the summary of tours. Dr. Karandikar said that he could not tell the distances between Banodi, Badda and Nakhatri, but the distance between Nakhatri and Khandewari was about 15 miles and between Khandewari and Sangal it was about 25 miles. Referring to the reks surveyed by the Pasni staff Dr. Karandikar said that the area of Gazdan was about 20 miles × 5 miles. Between Gazdan and Basole there was a creek which was one mile in width. Beyond this creek was

Basole which was 15 miles of rek again. The area between Basole and Ormara was partly rocky and partly of clay and the distance was about 30 miles. Pasni was situated at distance of about 20 miles from Gazdan. The area between Pasni and Rumro (the Western end of Gazdan) was mostly hilly and did not harbour locusts and this part was usually traversed on camel back. Mr. Burt said that all this showed that the fieldmen did not allow enough time to survey the area thoroughly as it would certainly take a longer time to cover this area than the time actually taken by them, if they carried out a thorough search. He felt that the work of fieldmen could only be checked, if they were given a strict programme and told to go to definite places and stay there for definite period. In reply to Mr. Burt, Dr. Karandikar said that his report was based on the records of the fieldmen, who supplied the details such as the number of locusts found day by day at various places, the general condition of vegetation etc. Mr. Burt suggested that the fieldmen should be given instructions to visit definite places only and a definite diary form to be completed. In the same connection Mr. Richards was of the opinion that the Locust Research Entomologist should make a plan of the places to be surveyed. Ultimately the sense of the meeting was that the Locust Research Entomologist and Assistant Locust Research Entomologist should draw up a scheme for improvement in the present method of survey and submit it to the Imperial Council of Agricultural Research Secretariat.

Pages 6 and 7.—No remarks.

Pages 8 and 9.—In answer to Mr. Richards, Dr. Karandikar said that he was satisfied that the observations were sufficiently intensive and that no locust breeding took place in the areas of the Pasni Rek surveyed.

Pages 10 and 11.—In reply to a question by Mr. Richards, Dr. Karandikar said that the relative humidity in a bush was determined by keeping a wet and dry bulb thermometer in the bush permanently and making observations at particular hours.

Page 12.—No remarks.

Page 13.—Mr. Richards enquired whether information was available in regard to the numbers of locusts placed in cages for breeding purposes at the beginning of the experiment and the numbers in existence now as this would give an indication of the rate of multiplication under optimum condition in the desert during the year. Dr. Karandikar replied that no records had been kept of the numbers of locusts produced in each generation under cage conditions. Mr. Richards suggested that this information should be maintained in future.

Pages 14 and 15.—Mr. Richards said that the inducement of sexual maturation and ovi-position by feeding with fresh Marrand shoots and maintaining soil humidity appeared to him important and to require extension; particularly as to whether it was water content of the food, or vitamin or other constituents present in the fresh shoots but not in the old, which induced sexual maturation. He thought that this should be extended to include other local desert plants. In this connection Dr. Pruthi suggested that the actual quantity of food consumed in both cases should be carefully noted. At the suggestion of Mr. Stewart the Committee instructed the Locust Research Entomologist to draw up a scheme of experiments to be conducted at Pasni for next year which will then be circulated to the Entomological Members of the Committee.

Page 16.—Referring to the rhythmic activity of the locusts, Mr. Richards remarked that these experiments should be conducted in big field cages. Dr. Karandikar said that this was not possible as about 30 per cent of the locusts climbed up during day time and remained there the whole of the night whatever the temperature and that they did not behave normally. The rest usually retired into the bushes, but it could not be said whether they also included some of those that climbed up and behaved abnormally.

4. *Proposals for the continuance of the Locust Research scheme (Subject No. 1 (c) of the Agenda).*—The conclusions and suggestions for future work made by the Locust Research Entomologist on pages 15 and 16 of his report on the work done by the staff under him during the year 1934 were then taken up.

(1) *Ecological Works.*—The Committee agreed that the work at Pasni and Ambagh should be continued, and that the survey Assistant already stationed at Karachi should be replaced by a biologically qualified man on Rs. 125 per mensem, his headquarters being fixed by Locust Research Entomologist and his work being supervised by him.

(2) *Survey Work.*—The Committee agreed that extensive survey work was now of less importance than the intensive survey and the work in Sind should be limited to the desert area in Thar-Parkar district. The intensive work should be carried out at 3 or 4 centres with two fieldmen at each. The Committee instructed the Locust Research Entomologist to draw up a scheme for the intensive survey work and submit it to the Council's secretariat for final orders.

(3) *Headquarters.*—Dr. Pruthi suggested that the headquarters of the Locust Research Entomologist should be at Pasni now that the work there was of such importance and needed the supervision of a senior officer. Mr. Burt explained the difficulties in supervising the work in Rajputana and Sind from Pasni and said that he considered Pasni an impossible Headquarters for the Locust Research Entomologist. After some discussions the Committee decided that the Locust Research Entomologist should be stationed at Karachi but that he should spend a fortnight at Pasni once every two months. The Committee were definitely of the view that the Locust Research Entomologist should in future be solely responsible for the work at Pasni and that he should frequently supervise the work of Dr. Karandikar who is his assistant. It was also agreed that the next report on the work at Pasni should be signed by the Locust Research Entomologist.

The proposal to establish a Central Laboratory at Karachi was withdrawn by Rao Sahib Ramachandra Rao in view of the intensive survey work now proposed and the revised arrangements for Pasni. He, however, put forward a proposal for a Laboratory Assistant to do some biometrical work. The Committee decided that a biometrical Assistant should be given to Mr. Ramachandra Rao for a period of six months in the first instance on a pay of Rs. 80 per mensem plus Karachi Allowance.

The Committee also agreed to the appointment of a Draftsman for mapping on a pay of Rs. 45 per mensem plus Karachi Allowance.

5. *Report of the Desert Locust Investigation at Lyallpur for the year 1934 and proposals for its continuance (Subject No. 2 of the Agenda).*—

Mr. Richards thought it desirable that the data so far collected should be collated and submitted to the Council in a comprehensive report. He considered that the necessary staff should be maintained for another twelve months to enable this to be done, and that further research work under the scheme should be suspended. Mr. Afzal Husain said that it was not possible to put the whole staff on the compilation work as it might be essential in some cases to carry out experiments again to verify the results already obtained. He added that he had already written up several papers and these could be published in series. Mr. Richards said that results of the extensive work would be more useful in the form of monograph with appendices, if necessary, to give the data of any incomplete work. Mr. Afzal Husain replied that the publication of all the observations and data would be very expensive without any proportionate advantage. Dr. Pruthi agreed with Mr. Afzal Husain that the work will be more useful to scientists if published in the form of a series of papers rather than a monograph which in the present case will not be a well balanced publication as the various aspects of the life of the locust had not been worked out equally well. Mr. Richards, however, said that as the Imperial Council of Agricultural Research had already spent about 3 to 4 lakhs of rupees on the scheme they should not grudge the expense required for adequate publication. Mr. Afzal Husain did not agree with the views expressed by Mr. Richards. Mr. Burt agreed with Mr. Richards that all the data so far obtained should now be published and added that if this work was to be continued for an indefinite period the best thing for Mr. Afzal Husain would be to draw up a fresh scheme, say for a 5-year period, and come up to the Council for a grant through the Punjab Government and the Provincial Research Committee. Mr. Afzal Husain however thought that the scheme would not fit in a five-year period. There was then a good deal of discussion in regard to the manner in which the data should be published. Mr. Burt said that an important question of principle was involved and suggested that the matter should be brought before the next meeting of the Advisory Board; Mr. Afzal Husain should be invited to state his views before the Board. The Committee then made the following recommendations:—

- (1) The grant asked for the continuance of the scheme be sanctioned on the condition that the primary object of this grant will be to compile the data already collected and to publish it in such form as might be decided upon by the Council.
- (2) That there should be no objection to Mr. Afzal Husain carrying out any experiments that may be required for filling up gaps in the present scheme provided they do not interfere with the compilation work referred to in (1) above.
- (3) That in view of the difference of opinion in the Committee as to whether the final report should be published in the form of a monograph or in a series of articles, the matter should be placed before the Advisory Board at its next meeting and Mr. Afzal Husain should be invited to attend the meeting and state his case before the Board.
- (4) That if this work is to be continued any further it should come up as a fresh application for a grant from the Council through the Punjab Government and its Research Committee.

6. *Report on the proceedings of the Third International Locust Conference held in London in September 1934.* (Subject No. 3 of the Agenda).—The Report was recorded.

7. *Biometrical studies on the desert locust* (Subject No. 4 of the Agenda).—Noted.

8. *Question of publication of Dr. Karandikar's paper "A general description of the Black Hoppers of the Desert Locust"* (Subject No. 6 (a) of the Agenda).

Question of publication of Dr. Karandikar's paper "Studies on the ecology of the Desert Locust (Schistocerca Gregariaphase Solitaria) in Southern Baluchistan (Subject No. 6 (b) of the Agenda).—The Committee did not agree to the publication of these papers, but Mr. Richards suggested in the case of the latter paper that it might be revised by the Locust Research Entomologist so as to include a description of the vegetation and physical condition of the Pasni rek areas.

9. *Application from the Government of Bombay for a grant of Rs. 56,795 spread over a period of five years for research on the study of the Deccan Wingless grass hoppers (Colemanu Splenarioidis)* (Subject No. 5 of the Agenda).—Mr. Richards said that he thought the problem one which should be tackled provincially. The scheme appeared to be based upon a vague estimation of damage, and to depend upon a number of assumptions which were not substantiated. He was therefore not able to support it. Mr. Stewart thought that extensive investigations on this problem had already been made by Dr. Coleman in Mysore but with what result he could not say. He therefore proposed that some further information should be obtained before arriving at a decision in the matter. Mr. Ramchandra Rao stated that he had first-hand knowledge of this pest, as he had happened to investigate it some years ago in Madras. He said that it was capable of causing great damage to dry cereal crops and that it was present in a pest form not only in the Bombay Presidency but also in parts of the Madras Presidency and in adjoining parts of the Mysore State and the Nizam's Dominions. It was essential to have the area of its present distribution thoroughly surveyed and demarcated. He added that it had only one generation in the year, that it did not show any gregarious characters, and that the decline in its numbers was mostly due to adverse seasonal rainfall. After some discussion it was decided that the Council's Secretariat should ask the Directors of Agriculture Bombay, Madras and Mysore for information as to the extent of damage done by this pest and such other information as may be available. The information thus received should be passed on to the Imperial Entomologist who should prepare a note for the consideration of the Committee at its next meeting. In the meantime the scheme should lie over.

10. *Representations from Messrs. Mohd. Ramzan, Chandar Prakash and Shantilal for the grant of an increased rate of annual increment* (Subject No. 7 of the Agenda).—The Committee agreed to increase the rate of increment from Rs. 2 to Rs. 4.

11. The meeting then terminated.

CHARAN DAS,

Secretary.

NEW DELHI;

The 19th January 1935.

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