

CONFIDENTIAL



INDIAN CENTRAL JUTE COMMITTEE

Proceedings of the First Meeting

OF THE

Jute Census Committee

HELD ON

THE 6th JULY, 1938.

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1938

AGENDA FOR THE FIRST MEETING OF THE JUTE
CENSUS COMMITTEE OF THE INDIAN CENTRAL
JUTE COMMITTEE TO BE HELD AT 1, COUNCIL
HOUSE STREET ON THE 6TH JULY 1938 AT 11-30 A.M.

1. A note on the position so far reached by the Indian Central Jute Committee on its work for the improvement of jute forecast.
2. Preliminary report of the Director of Agriculture, Bengal on crop census work in Bengal in 1937.
3. Report from the Government of Assam regarding the methods used in 1937 in collecting the revised figures of the jute area in the district of Sylhet.
4. To consider the scheme of work proposed to be undertaken by the Jute Census Committee during 1938.

(Sd.) A. P. CLIFF,
Secretary.

PROCEEDINGS OF THE FIRST MEETING OF THE JUTE
CENSUS COMMITTEE, HELD AT CALCUTTA ON
THE 6TH JULY, 1938.

PRESENT :

1. Mr. P. S. MacDonald, *President*.
2. Mr. M. Carbery, Director of Agriculture, Bengal, *Member*.
3. Mr. H. Graham, I.C.S., Secretary to the Government of Bengal, Agriculture and Industries Department, *Member*.
4. Mr. G. C. Limboussi, *Member*.
5. Prof. P. C. Mahalanobis, *Member*.
6. Rai Bahadur B. B. Mukherjee, Director of Land Records, Bengal, *Member*.
7. Mr. P. N. Sen, *Member*.
8. Mr. A. P. Cliff, Secretary, Indian Central Jute Committee, *Member and Secretary*.

The President said that Rai Bahadur B. B. Mukherjee, Director of Land Records, Bengal, had been detained at a meeting of Government and would join them later.

SUBJECT NO. 1.—*A note on the position so far reached by the Indian Central Jute Committee on its work for the improvement of the jute forecast. (Appendix I.)*

The President said that the note by the Secretary was intended to make clear, particularly for the information of members of the Committee who were not members of the Indian Central Jute Committee, the position so far reached in connection with the Committee's work for the improvement of the jute forecast. The Secretary had surveyed the whole matter very clearly from the beginning and explained the stage reached by Prof. Mahalanobis

with the statistical side of the work of the experimental survey carried out in 1937. He had explained the formation of this Jute Census Committee, its personnel, the administrative control and financial arrangements. He proposed that the Secretary's note be recorded and this was agreed to unanimously.

SUBJECT NO. 2.—*Preliminary report of the Director of Agriculture, Bengal, on crop census work in Bengal in 1937.* (Appendix II.)

SUBJECT NO. 3.—*Report from the Government of Assam regarding the methods used in 1937 in collecting the revised figures of the jute area in the district of Sylhet.* (Appendix III.)

The President said that both the reports were for their information and record but if any member desired to enquire further on any point, the officer concerned would do his best to enlighten him on the point.

Mr. P. N. Sen pointed out that the Director of Agriculture, Bengal's report covered only the field work and did not give the results of the statistical analysis. He was informed by Prof. Mahalanobis that permission was given to him to assist in this work late in November, and for lack of necessary facilities it had not been possible for him to begin seriously on the statistical analysis before April. The report on the statistical side of the work would be available by the end of July or beginning of August.

Mr. Sen pointed out that the difficulty in copying out from Khatians might be avoided by taking the copies from the *Khosras* (rough survey records). He further said that the months of July to September were the least suitable part of the year for field work such as enumeration of plots. During this time the crops were very high and it would be almost impossible for any one to identify individual plots. The best time for this work, he thought, was the beginning of March.

Prof. Mahalanobis said that until the sowing was completed in a particular district or sub-division, it was not possible to start the field work.

Mr. Sen suggested that sowing time depended on the level of the district and therefore work could begin with lower districts and then proceed on to higher ones,

Mr. Cliff pointed out that if they started too early they would have to omit high stretches and then go back and do these later, thus increasing costs. Mr. Sen pointed out that this would happen if the land was undulating but that was not the case in the jute area.

Prof. Mahalanobis said that one thing was clear that an enumeration of any type ought to start at the earliest opportunity immediately after the cessation of sowing.

It was agreed that when sowing was complete in each unit, the work must begin there, and the programme be arranged accordingly.

Mr. Sen further suggested that for their primary investigation work they should appoint village *Amins* who had previous survey experience and, could be appointed through the Circle officers at low rates but both professor Mahalanobis and Mr. Carbery expressed doubts as to whether these men were really suitable for this work. Prof. Mahalanobis however agreed with Mr. Sen that though these *amins* were not always dutiful very good worth could be had from them if there was strict supervision.

The report was recorded.

The President then drew their attention to the report of the Government of Assam.

Prof. Mahalanobis said that in a complete enumeration, without checking, the errors in individual Mouzas varied from 50 to 60 per cent. to over 100 per cent. The difficulty in completing enumeration was not in doing the work on paper but in getting really accurate records. According to the Assam Government's report, the census work there cost a rupee per three acres of jute, but to work out the Provincial cost on that basis was misleading as this would depend also on intensity of jute cultivation.

Mr. Sen enquired what unit Professor Mahalanobis preferred as being fairly uniform.

Prof. Mahalanobis said he thought the "Thana", but some of the big thanas must be divided into 2 or 3 sections.

Mr. Sen said that when they would begin survey in August most of the jute would be cut, and they would be too late in beginning the work.

Prof. Mahalanobis said that the cost would be much the same even if the jute was cut. It was his considered opinion that they would be wasting money if they proceeded to a provincial survey without some such exploratory survey as he proposed this year. He was calling this an exploratory survey to enable them to organise a survey on a provincial scale in 1939. For this, work on the scheme would have to be started in November to get the plans ready. The detailed sampling scheme and plans of all the grids must be made ready before field work could start, and this would take 4 or 5 months. They also wanted to get some idea of the cost. Without some such experimentation this year, they could not go on with the provincial survey next year. He further pointed out that last year's survey was decided on too late and this year's survey also was being taken up too late. He feared unless they pushed on at once, the next year's survey would again be too late. Mr. Sen pointed out that it was too early to speak of a provincial survey. A survey was carried out in 1937 but we have not yet got its final results. We are now landing upon another exploratory survey and do not know when we shall get the results of these second series of operations. And the provincial survey would have to be based, as regards methods, on the results of these two surveys. Before these are available and there has been a thorough examination of the efficiency of these methods the provincial survey can hardly be taken up in a similar manner.

The report of the Assam Government was recorded.

SUBJECT NO. 4.—*To consider the scheme of work proposed to be undertaken by the Jute Census Committee during 1938.*
(Appendices IV, V and VI.)

The President said that before they could discuss the scheme they had first to decide whether they agreed to pay Prof. Mahalanobis the allowance he asked for.

Prof. Mahalanobis first asked that the Committee consider the full letter he had sent to the Secretary on the subject on the previous

day (Appendix VI.) He then explained at length his reasons for asking for an allowance of Rs. 500 P.M. quoting precedents. He stated that for more than 15 years he has done a good deal of statistical work for the Government of Bengal as well as other Governments, Universities and public institutions in a purely honorary capacity, and had never asked for or received any honorarium for such work. This year it was suggested to him that he should be placed on deputation for the Jute Census work on a whole-time paid basis. For various reasons he did not consider this necessary, as he thought he would be able to do the work equally well in addition to his duties in College provided necessary facilities were given to him for this purpose. He therefore suggested that he should be given a part-time allowance of Rs. 500. This was less than what he used to get as part-time Meteorologist in 1926. He pointed out that in case his services had been requisitioned on a whole-time basis, the cost would have been at least Rs. 2,000 per month, so that the present plan would be far more economical. He felt that there was no chance of statistics playing its legitimate part in national welfare until its value was properly appreciated; and that he was unable, for his private gain, to allow statistical services being assessed at too cheap a rate. He therefore offered his services in a purely honorary capacity on condition that, instead of giving him an honorarium, the whole of the money was given as a donation to the Indian Statistical Institute. He was fully determined to vindicate the position of statistical science in this and all such work. He had suggested alternatives but if he was to accept any honorarium the allowance to be paid must be consistent with his status as a Statistician. He preferred not to bargain. With the President's permission, he then left the meeting.

The President said he thought they all agreed to the principle of an allowance but he thought the amount unduly high. He pointed out that the extent of the allowance would be in the nature of a gesture for the additional work the Professor would be called upon to undertake and would not be intended to be commensurate with the work involved or an assessment of his worth.

A discussion took place as to whether this suggested allowance should be agreed to, and eventually Mr. Graham proposed that the Committee accept the proposal of Prof. Mahalanobis and agree to

pay him Rs. 500 per month as his allowance, subject of course to the sanction of the Government of Bengal being received.

Mr. Sen seconded the proposal.

The proposal was accepted.

The President informed Prof. Mahalanobis that the Committee had agreed to his proposal and the Professor expressed his appreciation of the Committee's recognition of his services. He understood the matter would require the sanction of the Government of Bengal, but in any event the Committee could depend on him to carry on the work for this year.

The meeting then adjourned for lunch.

The Committee resumed discussion on subject No. 4 at 3-30 P.M. The President being unavoidably absent, Rai Bahadur B. B. Mukharji presided.

SCOPE OF WORK.

The Committee first took up consideration of the scope of the work to be undertaken during the present year. Mr. Graham drew attention of the Committee to paragraph 16 of the scheme of work proposed to be undertaken and said that in selecting the districts in which the work would be done, he thought they should be modest.

Mr. Sen suggested that the leading jute districts should be selected for the purpose of survey because they represented 90 per cent. of the total jute area.

Prof. Mahalanobis said that he objected to such selection as they must gain experience and knowledge of conditions prevailing in different districts. This was an exploratory survey to guide them in their future work, and therefore thought that they should gain as wide an experience of the different districts of variable nature as possible. He thought that it would be quite possible to make good use of the sample survey of 1935 to guide them in respect of the Thanas to be selected in such districts. They were not concerned with variety of jute, but what was most important was the intensity of the cultivation of the crop. After some discussion it was decided that some work should be attempted in the districts of Mymensingh, Dacca, Rajshahi, Tipperah, Fubna, 24 Parganas, Rangpur, and Murshidabad but the Committee agreed to give discretion to Prof. Mahalanobis in selecting thanas in each district

keeping in mind the intensity of cultivation and also communications.

ORGANISATION.

(a) *Statistical Organisation.*

Prof. Mahalanobis said that with regard to statistical organisation, his object was to train up two or three whole-time statisticians. In the initial stage they would require two whole-time men and some part-time men to find out exactly which of them would shape well for the work.

The Chairman enquired what type of men was required and if these would be appointed through the Public Service Commission.

Prof. Mahalanobis said that he was not quite sure just now, but eventually for the senior statisticians they should recruit men who would have the status of a University Lecturer on the scale of pay, Rs. 250-600, and assistants say on the scale of Rs. 150-400. For the present experimental work he thought two statisticians on Rs. 150 each and up to 4 on part time with allowances of about Rs. 50 each would do.

Mr. Cliff said that appointments would not be made through the Public Service Commission, but that Prof. Mahalanobis would select them from among those working at the statistical laboratory.

Mr. Sen suggested that they should advertise the posts to give all applicants a fair chance. The proposal was not agreed to and it was left to Prof. Mahalanobis to select men for his requirements, it being agreed that there should be no restriction in the matter of Provinces.

It was thereupon agreed that provision for statistical supervision of the experiments should be:—

Statistical Adviser—Allowance	...	...	Rs. 500/-
2 Statisticians, wholetime, on Rs. 150/-p.m. each	...	...	Rs. 300/-
4 Asstt. Statisticians (part-time) on allowances up to Rs. 50/-p.m. each.	...	...	Rs. 200/-
			<hr/>
			Rs. 1,000/-

(b) Field Organisation.

Mr. Graham said that regarding the field work, Prof. Mahalanobis wanted Mr. Nihar Chandra Chakravarty as supervisor as Mr. Chakravarty had had experience of this class of work. He agreed to this proposal and the Revenue Department, Bengal, had also agreed to spare him. The Commerce Department, Bengal, said that they would not require Mr. Chakravarty's services till the next cold weather, while the Board of Economic Enquiry said that they could spare him but he should be available whenever his services were required for the work of the Economic Enquiry.

Prof. Mahalanobis said that Mr. Chakravarty would really be required for field work say up to the first week of October, as his main work would be to organize the field work. After October his work would naturally be much lighter.

It was thereupon agreed that Babu Nihar Chandra Chakravarty be appointed as Field Supervisor, and Babu Amrita Lal Mukherjee and one Sub-Deputy Collector be appointed as Assistant Supervisors. It was expected that the Government of Bengal would spare the services of Mr. Chakravarty and continue to pay him, but in case an allowance was necessary Rs. 275 was reserved in the budget. The Sub-Deputy Collector should have some experience of organisation work and also knowledge of settlement work. He must be a good, energetic and out-door man having knowledge of field work. His services would be required until the end of December next. Rs. 200 would be necessary as pay and allowance of Babu Amrita Lal Mukherji and up to Rs. 250 for the Sub-Deputy Collector.

As regards inspection, Prof. Mahalanobis proposed that for this year's work 15 or 16 Inspectors would be required, at an average pay of Rs. 75 per month.

The Chairman said that in the case of settlement work, Inspectors were paid Rs. 40 or Rs. 50 P.M.

Mr. Carbery enquired whether the Inspectors would also copy the settlement records to which Prof. Mahalanobis replied that

they would do this and also necessary statistical work in connexion with the sampling experiments and the preparation of sample grids when they are not required in the field.

It was agreed to appoint 16 Inspectors on pay varying from Rs. 50 to Rs. 100.

Prof. Mahalanobis pointed out that about 5000 Mauza maps would be required for the work and expressed the hope that the Director of Land Records would supply them free of cost.

The Chairman said that there was no provision for free supply of maps, the cost of which was 4 annas each, but in case they were required on loan it would be possible to supply.

Mr. Sen enquired of the Chairman if *Khesras* of records were available. The Chairman informed the Committee that all *Khesras* were destroyed previous to the year 1934.

The Committee agreed to provide up to 100 village investigators on Rs. 30 P.M. (including T. A.) for 2 months and discussed various methods of recruiting suitable men. It was agreed that men should be recruited by the Inspectors in consultation with the Circle Officers.

Mr. Graham agreed to issue instructions through the Revenue Department that the District administrative staff should give friendly help to the Committee's staff and introduce them to the Union Boards, and see that their work was not hampered.

Finally the Committee agreed to the following budget for survey during 1938:—

A. Statistical Supervision.

Rs.

- | | | |
|---|-----------|-------------|
| 1. Statistical Adviser Allowance ... | 500/-p.m. | |
| 2. 2 Statisticians @Rs. 150/-p.m. each | 300/- | |
| 3. Up to four part-time Assistants on allowances up to Rs. 50/- each. ... | 200/- | Rs. 1,000/- |

		B. F.	...	Rs.
B. FIELD SUPERVISION.		Rs.		
1.	Supervisor—Allowance	...	...	275 p.m.
2.	Asstt. Supervisors :—			
	1 @ Rs. 200			
	1 @ Rs. 250	...	...	450 ,,
				<hr/>
				725
3.	Inspectors and Asstt. Inspectors up to 16 on between Rs. 50 and Rs. 100	...	...	1,200 ,,
				<hr/>
				1,200
4.	Computers, typists, and general assistants (20—50) 20 @ Rs. 40	...	...	800 ,,
				<hr/>
				800
				<hr/>
				3,725
				<hr/>
	FOR SIX MONTHS	...	.....	22,350
5.	Village Investigators			
	100 @ Rs. 60 for 2 months	...	...	6,000
6.	Travelling Allowance	...	...	3,000
7.	Contingency	...	...	3,650
				<hr/>
				35,000

It was agreed that men should not be appointed until they were actually required.

Mr. A. P. Cliff enquired whether a report on the work started and the staff employed, could be supplied in early August for the information of the Indian Central Jute Committee.

Prof. Mahalanobis said he would submit a report of his progress, and the statistical report of the last experimental survey in good time for the next full Committee meeting. He thought that he would be able to give a short report before the full Committee meeting of his progress in the jute census work.

The Committee recorded that they thought it essential that the report on the experimental work now being undertaken be available for consideration well before they had to decide on next year's work.

The meeting then closed.

(Sd.) A. P. CLIFF,

Secretary.

APPENDIX I.

NOTE BY THE SECRETARY ON SUBJECT NO. 1.—*A note on the position so far reached by the Indian Central Jute Committee on its work for the improvement of jute forecast.*

1. At its first meeting held in February, 1937, the Indian Central Jute Committee decided that it was exceedingly important that it should undertake the work for the improvement of the jute forecast. It decided that what was required was a complete census of the jute areas sown, spread over five years, the areas being divided into five blocks and the areas sown to jute in one block being recorded each year. It decided that it was even preferable to get complete crop census spread over 5 years as the totals for the different crops would check against the total area sown, and less detail supervision would be necessary. The Government of Bengal were therefore asked if it would undertake in the near future a complete census of all crops sown spread over a period of five years, to the cost of which the Committee would contribute Rs. 50,000 a year for the sake of getting jute figures. If the Government of Bengal was not able to undertake this, the Committee proposed itself to organise a jute census on a five-year basis.

2. The Government of Bengal replied in due course that they did not consider that a complete crop census spread over a period of five years would be of any value either to the Government or to the Committee. The method they considered suitable was a random sampling survey of the whole province every year. They considered that a preliminary experimental work would be necessary to work out the technique and arrive at accurate estimates of cost.

3. The Committee replied that they considered a complete census certainly of the jute area, and preferably of all crops sown, to be an essential basis of any system of random sampling. It thought that a random sampling survey would supplement the census and might in time, suffice to keep the census figures accurately revised.

4. The Government of Bengal replied that the rough estimates they had been able to obtain indicated that the cost of the complete crop census spread over 5 years would be prohibitive. They thought that experimental surveys should be undertaken both to provide accurate estimates of cost and to give information on the technique. They proposed that experiments on a small scale in three Thanas near Calcutta should be undertaken at once. The cost was estimated at Rs. 10,000 which they asked should be borne by the Indian Central Jute Committee.

5. The Committee at its second meeting in August, 1937, considered this correspondence and accepted the Government of Bengal's proposals for a small scale experimental survey and agreed to pay Rs. 10,000 as the estimated cost for the survey.

6. The experimental survey was therefore undertaken at the end of 1937, the field work being in charge of the Director of Agriculture, Bengal, while Prof. Mahalanobis was the Statistical Adviser and undertook the working out of statistical interpretation of the figures collected.

7. At its third meeting at the end of February, 1938 as the final report on these experiments was not available, the Committee with the assistance of the Director of Agriculture, Bengal, and Prof. Mahalanobis, considered the progress that had been made with the experiments. It learnt that the field work of the experiments had been completed and that one-tenth of the statistical interpretation had been carried out. It decided firstly that statistical treatment of the figures collected from the experiments was urgently required, it would assist Prof. Mahalanobis in this work by providing funds for the extra staff and other facilities required to enable him to get the statistical examination of the figures rapidly completed. It further concluded that it was extremely difficult if not impossible, to carry out experimental work of this very special nature through the usual administrative channels. It therefore decided to enquire of the Government of Bengal (1) whether instead of the Indian Central Jute Committee making a grant to the Government of Bengal for work on the improvement of the jute forecast, the Government of Bengal would make a grant to the Committee for the purpose.

(2) Whether the Government of Bengal would agree to this work being done by, and expenditure on it controlled by, a small *Ad hoc* Committee.

(3) Whether the assistance of the district administration that would be required for the carrying out of the work could be arranged if the work was done under the control of such a Committee.

(4) Whether administrative arrangements could be made to enable Prof. Mahalanobis to devote to the statistical side of this work the time required to enable it to be promptly and effectively carried out.

8. Prof. Mahalanobis put forward an estimate of the cost of completing rapidly the statistical examination of the figures already collected, and the Local Sub-Committee of the Indian Central Jute Committee approved expenditure up to Rs. 12,500/- during the current year on the extra staff and other equipment required to get this work done. At the same time, the Government of Bengal was approached to provide the other facilities necessary and, during April, the necessary arrangements were made; so that from about the middle of April the statistical examination of the figures collected from the experiments carried out last year, was greatly speeded up together with the plans for the next stage of the survey and the work is presumably almost complete. Meanwhile during May, 1938, a copy of the preliminary report by the Director of Agriculture, Bengal, on the crop census of Bengal in 1937 was forwarded to the Committee. Copies of that report are being supplied to members. During May also discussions took place between the Secretary of the

Indian Central Jute Committee and the Secretary to the Government of Bengal, Agriculture and Industries Department, regarding the Committee's proposals for the *Ad hoc* Committee and the contributions to be made, to the cost of the work to be done, by the Committee and the Government of Bengal. On the 15th June, 1938, the Government of Bengal replied formally to the Committee's enquiries as follows :—

- (1) It accepted the proposal that experimental work in connection with the improvement of the Jute forecast during the current financial year, 1938-39, should be conducted by the Indian Central Jute Committee through the medium of a small *Ad hoc* Committee.
- (2) That the Government of Bengal would contribute Rs. 17,500/- towards the expenses of the work, the Indian Central Jute Committee contributing an equal sum.
- (3) That arrangements would be made to enable Prof. Mahalanobis to devote sufficient time to the statistical side of the experimental work but that the expenses of the extra staff necessitated by this arrangement would set off against the Government's contribution.
- (4) The Government of Bengal would assist the Special Committee with the services of one or two Deputy or Sub-Deputy Collectors and would arrange that it should receive the assistance of the district administrative staff, as required.
- (5) But it requested the Committee to keep prominently in view the necessity of co-ordinating the experimental work to the requirements of a possible restriction policy particularly as to how a quota could be allocated over the whole area.

9. At the meeting of the Local Sub-Committee on the 27th June, 1938 the Indian Central Jute Committee thereupon set up a Special Jute Census Committee for the year 1938-39, to conduct during that year experiments on the improvement of the jute forecast and to control the expenditure on that work. The Committee was constituted as follows :—

1. Vice-President, Indian Central Jute Committee	...	<i>President.</i>
2. The Secretary to the Government of Bengal, Agriculture and Industries Department	... ..	<i>Member.</i>
3. The Director of Agriculture, Bengal	... ..	„
4. The Director of Land Records, Bengal	... ..	„
5. Prof. P. C. Mahalanobis	... ..	„
6. Mr. G. C. Limbousi	... ..	„
7. Mr. P. N. Sen	... ..	„
8. Secretary, Indian Central Jute Committee	... ..	<i>Member and Secretary.</i>

The funds that are immediately available for the Committee's work are :—

- (1) Rs. 17,500/- expected to be available from the Committee's budget for 1938-39 when this is sanctioned.
- (2) The contribution by the Government of Bengal of Rs. 17,500/-.
- (3) Whatever is not required for that purpose out of Rs. 12,500/- set aside by the Committee for expenditure on the statistical examination of the figures collected from last year's experiments.
- (4) The Committee in its budget for 1938-39 proposed to spend in all Rs. 50,000/- during the current year on this work. It allocated in March Rs. 12,500/- as mentioned above leaving a balance of Rs. 37,500/-.

But in response to a request from the Government of India to indicate what economies in its budget were possible it agreed demiofficially to a reduction of the allotment under this head by Rs. 20,000/-, leaving a balance probably available of Rs. 17,500/-. When its budget is sanctioned and it sees the expenditure on its various other schemes it is possible it may be able to allocate further sum to this work up to maximum for the financial year of Rs. 50,000/- including what has already been allocated for the statistical interpretation of last year's figures. It has also enquired of the Government of Bengal if that Government would in turn raise its allotment. For the present the Committee has Rs. 35,000 plus a small balance of possibly Rs. 5,000 which may be available from the Rs.12,500 allotted to the statistical examination of the jute figures.

APPENDIX II

NOTE BY THE SECRETARY ON SUBJECT NO. 2:—

Preliminary report of the Director of Agriculture, Bengal on crop census work in Bengal in 1937.

At its second meeting held in August 1937, the Indian Central Jute Committee accepted a proposal of the Government of Bengal for carrying out a preliminary experiment at a cost of Rs. 10,000 to endeavour to determine in small area the comparative costs and efficiencies of the jute census as against different systems of random sampling. An interim report on the experimental survey carried out by the Director of Agriculture, Bengal, is attached for the information of the Committee. (Enclosure.)

A note on the subject prepared for the information of the Indian Central Jute Committee at its third meeting by Prof. P. C. Mahalanobis who was associated with this work is also attached. (Not printed.) •

ENCLOSURE TO APPENDIX II.

Report on Crop Census work carried out in Bengal in 1937.

The present method of estimating the jute crop for purposes of Forecast has proved very unsatisfactory and is usually a long way out when compared to actuals. For this reason, it was decided to see if some other method could not be evolved in order to get a more accurate figure. After discussion with Prof. P. C. Mahalanobis, we decided that the first thing that should be done was a small test, which should cover 3 or 4 Thanas and would include a complete enumeration of all crops, plus two or three methods of random sampling. The arrangement of the work was that the field work would generally be under me, while Prof. Mahalanobis did the statistical part.

Three Thanas were chosen near Calcutta in order that supervision might be fairly easy, but the one in Howrah had to be given up as the Settlement records were not ready in that district. The final choice was Deganga and Sonarpur in 24 Parganas, and Tarakeswar in Hooghly. These were chosen as they were complex areas of different kinds of crops, and also were fairly difficult areas in that they had a large number of *bhils* and tanks and cross-country travelling was difficult. This is more or less common in the jute areas in Eastern Bengal. Further, it was necessary that they should be fairly close to Calcutta for careful supervision.

In the first place, a complete enumeration of all crops were made and this was followed by three random methods. One was the Mouza system, secondly the Plot, and thirdly the Grid. A complete enumeration was necessary not only to give the cost of this method, but also to provide a check on the three random methods.

In carrying out the work it was found that the field work progressed fairly rapidly despite adverse conditions, but the copying work done in the Collectorates was exceedingly slow. The only way to get the plot numbers and areas was to look through the Khatians which took a great deal of time and demanded a good many men. The Khatian registers were also wanted by the Settlement and other branches of the Collectorate, while there were always very great

difficulties in finding space for the Census staff. Further, the actual hours of work were only from 11 A.M. to 5 P.M., and on Saturdays for three hours only. The Collector of 24 Parganas, however, was good enough to agree to opening his office during the Pujahs if we had not completed the work by that time. This copying work adds considerably to the cost of any method of crop surveying for it must be remembered that there are no other records in any of the districts of Bengal which is a permanently settled area.

In carrying out the field work in Deganga, which was begun on September the 10th, many difficulties were met with. There is only one good road through the middle of the thana for the heavy rains at that time of the year had made the other kutchra sideroads impassable. There is a good deal of *bhil* area there both in the North and South of the Thana, and practically no boats of any kind available. This considerably slowed up the work. Further, practically every member of the staff was laid up with malarial fever in the course of the work. Another difficulty was the village area, which was very hard to establish correctly on the Mouza map.

The selection of random plots is made directly from the Khatian records at the time of copying by choosing anyone plot at random from the first twenty and then continue taking every 20th without any consideration about the nature, size or other aspects of the plots. Thus 5% of the total number of plots was surveyed in the present census.

The chain of continuation regular order of plots may of course break in case one of them does not exist on the map; thus, for example, if plot No. 120 is not on the map, the next existing plot is taken and 20 added to it subsequently.

The actual identification of the plot in the field in this case is extremely difficult sometimes:—

(a) as the plots in the fields do not lie in serial order or in regularity. Plot 1 may be in one corner and 20 in another remote part, and so on;

(b) owing to subsequent change in shape, size, by further fragmentation or by dissolution of *ails* (boundaries) and incorporation with another; and

(c) for reasons of inaccessibility due to standing water and various other causes. Such an occasion may also arise in the Complete Enumeration, but this then only forms an infinitesimal part of the large total and so does not affect the accuracy to any reasonable extent whereas, in the case of Random Plot, missing it means rather a big difference.

(1) The area of each grid is approximately 5 acres.
Grid method.

(2) For every square mile 12 grids are thrown at random. 10% of the area is thus sampled.

(3) The scale of the Mouza map being 16" to the mile, a square (2×2) inches or 1·414 in each side gives the required grid.

(4) In the printed jurisdiction list (available for each Thana in the Collectorate) area of each mouza is available. Thus the number of grids required for a mouza may be obtained therefrom. It is of course necessary to measure by scale the area where there are more than one sheet in the mouza. One extra grid, then, is to be added always to avoid overlapping or other exigencies.

(5) Now it is necessary to obtain the number of actual existing plots from the mouza map and divide it by the number of grids arrived at (vide (4) above). The first plot has to be selected at random from the mouza map by taking one of the digits of the quotient and then adding the quotient to the number of the first selected plot. The sum represents the plot selected next and thus all the subsequent locations are obtained by adding the quotient to the number of the last plot selected.

A square (2×2) inches is to be described on the North-East corner (right hand top) of the selected plot keeping parallel to the North line. Exceptional deviations may arise which may necessitate some modifications of the method.

Herein the grids are required to be formed of the mouza maps first and then the number of plots falling in the grid are to be recorded in the area schedule forms and then the area taken for these plots from the Khatian. The forming of grids does not involve any considerable time or sum of money. It is conducive of better and accurate results and approved of such authorities as

Prof. Fisher who suggested a slight modification that the area of the plot should be the basic factor instead of the number of plots taken in the present survey.

The process, besides, is not as intricate as in the case of identification of the random plots. The grouped plots may not all change in shape or size and there are always some characteristic features of certain plots which render the identification much easier in the group. It is considered that this may form the ultimate line of our future surveys if the method statistically appears to be fairly accurate and sound.

Each of the Thanas for this purpose was divided into Unions and selection at random was then made
 Mouza method. of the mouzas to represent each Union.

This formed 10 % of the total number of mouzas surveyed. There were thus 9 mouzas selected in Tarakeswar Thana and 11 in Deganga Thana. These mouzas were enumerated completely as in the basic method. In this case, while the selected mouza may be a fair representative of a Union, yet it may not indicate all possible variations—homogeneity or heterogeneity—of the Union with regard to crop, soil characteristic, etc., owing to its being a compact area. In case of plots of grids these factors are well represented due to their scattering and frequency in different parts of each mouza the ultimate unit.

The area schedules are filled up from the Khatian after selection of the mouzas and the field work then proceeds.

One of the Chief difficulties met with was the fact that the work
 Difficulties. had to be begun in such a hurry that previous arrangements could not be made. Mouza and Thana maps, and forms, etc., all should be ready before any work is undertaken. As already stated an underestimate was made with regard to the work of copying in the Collectorate, with the result that some of the field workers had to be diverted to this. Of the original staff, who were mostly passed students of the Dacca Agricultural School, some left on account of fever, while some others only stayed for 2 or 3 days. To begin with, only one or two men per mouza was arranged for, but this proved difficult from the point of view of accommodation and food

in the villages; and it was found that, if 4 or 5 worked together, more satisfactory arrangements could be made, at any rate, about food, as one or two could stay in and do their copying work and, at the same time, prepare food for the others who were out in the fields. Communications were also extremely difficult and much time was wasted in delays in forwarding the forms which had been filled in.

Most of the first batch left on completion of the Deganga Thana, and the second batch for Tarakeswar were mostly Amins or at least Matriculates. There were also some graduates and under-graduates amongst them. They were rather more fortunate in that the weather was beginning to improve and conditions were not so bad as had been originally in Deganga. Further, the previous experience gained in that Thana had made it possible for us to plan the work for Tarakeswar more precisely, with the result that the work done was much more satisfactory and a good deal quicker.

The accuracy with which the complete enumeration done can only be checked by the Statistical Section
Accuracy of results. by means of the Mouza random survey. But, as far as the latter method was concerned, it seems to me to offer many objections. It is very doubtful if the mouzas selected are at all representative of the area concerned, and the method does not seem to be a satisfactory one though it is the cheapest. As far as the Random plot method was concerned, the difficulty here, as far as the field work goes, was mentioned under the Random plots above. It is very doubtful therefore, whether the accuracy of this method can be depended on. The Grid did not present so many difficulties and, as far as field work is concerned, is probably the best of the random methods.

The work was unfortunately delayed in starting until September the 10th, and so I informed Prof. Mahalanobis that for checking the work it would be better only to consider two crops, *i.e.* Aman pady and sugarcane, as they were the only two crops likely to remain from the time the work was started till it was finished. As already stated, the unexpected heavy work required in copying from the Khatians, as well as the field difficulties in Deganga, considerably delayed the work. Even though the staff worked through the Pujahs, it was very late before the work was begun

in Tarakeswar. The field work in this Thana was however, completed fairly early in December though much copying work still remained to be done. It was hopeless to consider trying to take up the third Thana.

The total cost for each method has been worked out in Table I(a). This is, however, an area, of Cost. 68,000 square miles, in other words, the area which would have to be covered if any of the methods were applied towards jute survey only. It should be noted that the complete enumeration costs some Rs. 25 lacks, and as this will only give one season of the year, either Kharif or Rabi, it would have to be doubled for the total areas of all crops. For the whole province, another 7th will have to be added, roughly a total cost of 57 lacks. The random mouza method can be done for a cost of Rs. 2¼ lacks, but it is doubtful if this is a satisfactory one for the reasons mentioned above. The random plot method will cost Rs. 622,930, and the Grid Rs. 11¼ lacks. It is possible that some of these costs could be reduced as the staff became more expert. (It will be noticed in some of the other tables that there is a considerable variation between the amount of work done by different workers and the time taken.) But even then the cost of any reliable method is going to be very considerable and much heavier than was anticipated,

Director of Agriculture, Bengal.

The 19th March, 1938.

FIELD OPERATION.

Average No. of plots per hr. per man.	Deganga thana field work : copying		Tarakeswar thana field work : copying.	
	Random plot	13·35	49·68	10·63	36·60
Grid	24·87	66·86	20·65	56·54
Random mouza	186·81	159·20	77·10	178·10
Complete Enumeration	101·15	137·55	102·38	143·90

KHATIAN TO FORM.

—	Average No. of plot per hr. per man.	Average No. of plot per hr. per man.
Complete Enumeration	130·32	166·40
Random	30·66 (from K.)	191·64 (from C. E.)
Grid	159·64 (from C E.)	161·27 (do)
Random Mouza	226·80	202·40 (do)
Gridding and Extracting	1·82 grids per hr.	1·78 grids per hr.
Average No. of plots per grid	17·39	19·84

TOTAL NO. OF PLOTS DEALT WITH.

—	Tarakeswar.	Deganga.	Total.
Random plot	5573	8586	14159
Grid	10954	16284	27238
Mouza Random	8905	19512	28417
Complete Enumeration	112315	171250	303565
	137747	215632	353379

Crop Census Work 1937.

TABLE 1.

COSTING.

				Tarakeswar.	Deganga.
(1) Grid.					
Total No. of Grids	...	...	...	936	552
Total No. of plots	...	...	...	10954	16284
Net hours for copying "area"	...	...	...	67·92	102·00
Net hours required for field work	...	...	...	530·50	654·75
Do. copying from map to form	...	...	...	193·75	243·56
Do. for gridding and extracting plots Nos. from map	...	...	...	310·00	514·00
				1102·17	1514·31
(2) Random plots.					
Total No. of plots	...	...	...	5573	8586
Net hours required for copying from Khatian	...	...	...	29·08	87·00*
Net hours required for field work	...	...	...	524·25	643·05
Do. for copying from map	...	...	...	152·25	172·83
				705·58	902·88
(3) Random Mouzas.					
Total No. of plots	...	...	...	8905	10512
Net hours required for copying	...	...	...	44·00	102·00
Do. for field work	...	...	...	115·50	104·50
Do. copying from map to form	...	...	...	50·00	122·50
				209·50	329·00
(4) Complete Enumeration.					
Total No. of plots	...	...	...	112315	171250
Net hours required for copying from Khatian	...	...	...	675	1314
Do. for field work	...	...	...	1097	1693
Do. copying from map	...	...	...	780	1245
				2552	4252

*Directly from Khatian.

TABLE 1(a).

1. Grid system required	... 436.08 m days net for 124 sq., miles.
2. Random plot ,,	... 268.07 m ,, ,, 124 ,, ,,
3. ,, mouza ,,	... 89.75 m ,, ,, 124 ,, ,,
4. Complete Enumeration	... 11.34 m ,, ,, 124 ,, ,,

II.

Estimated cost for a unit of 1,000 sq. miles.

For survey investigators only.

1. Random survey (1) grid 12000 grids 10% survey constituting 2/5 of C.E.	... ..	3516.76 m days.
(2) R. plot 75,000 plots 5% survey forming 1/4 of C. E.	... ..	2161.85 m ,,
(3) R. Mauza 1,000 mauzas 10% mouza forming 1/12 of C. E.	723.79 m ,,	
2. Complete Enumeration	... ..	9145.16 m ,,

The following are totals for other items calculated for 1,000 sq., miles.

1. Pay of supervising staff, computer, clerk and peon Rs. 1,316.5 for 124 sq., miles	... ..	Rs. A. P. 10,616 15 0
2. Allowances for staff Rs. 620 for 124 sq., miles	... ..	5,000 0 0
3. Travelling allowance Rs. 1,678 for 124 sq., miles	... ..	13,532 0 0
4. Contingent charges including stationery, maps forms, paper including printing charge and other incidentals Rs. 240 for 124 sq., miles	... ..	1,935 8 0
5. For statistical analysis figures can not be had until work is complete. It is however based on the present allotment of Rs. 1,800 for 124 sq., miles	... ..	14,500 0 0

III.

Grid survey.	Random plot.	Random Mauza.	Complete Enumeration.
Investigators 58 men for 2 months @ Rs. 35 per mensem. Rs. 4,060.	36 men for 2 months Rs. 2,520.	12 men for 2 months Rs. 840.	152 men for 2 months Rs. 10,669
Pay of supervising staff as per 1 above 2/5 of C. E. 2459.	1/4 of C. E. 1530	1/12 of C. E. 510	Rs. 6,125
Allowances as per 2 above 1155.	720	230	Rs. 2,885
T. A. as per 3 above 3120.	1950	615	Rs. 7,800
Contingencies as per 4 above 445.	280	95	Rs. 1,115

TABLE I (A).—contd.

Grid survey.	Random plot.		Random Mauza.	Complete Enumeration.
Statistical analysis as per 5 above	3315	2000	005	8,305
	14575	8000	2085	36,950
Total cost for Bengal (68000 sq. miles)	9,91,100	5,50,120	2,02,980	25,13,212
Total cost for Bengal including non-jute districts ...	11,22,275	6,22,930	2,29,845	28,45,843
For two seasons a year ...	22,44,550	12,45,800	4,50,600	56,91,686

GOVERNMENT OF BENGAL.

AGRICULTURAL DEPARTMENT.

Crop Census Year.

J. L. No. Rabi Kharif
 Mauza
 Union Board
 Thana
 District
 No. of sheets of map
 No. of plots
 Omission
 Area of Mauza as per J.L.
 Pages
 Name of Field Investigator
 Date of Investigation
 Time taken
 Name of Copyist who noted areas from Collectorate Khatians
 Date From plot No. to plot No.
 Time
 Name of Investigator who posted areas from maps
 Date
 Time.

APPENDIX III.

NOTE BY THE SECRETARY ON SUBJECT NO. 3.—*Report from the Government of Assam regarding the methods used in 1937, in collecting the revised figures of the jute area in the district of Sylhet.*

At its first meeting in February, 1937, the Indian Central Jute Committee discussed the special steps necessary to get correct jute area figures for Assam. It was decided to ask the Government of Assam to undertake a detailed jute survey of the two permanently settled districts of Sylhet and Goalpara, one to be done in each of the next two years at an estimated cost of Rs. 10,000/- each which the Committee was prepared to pay. The temporarily settled districts would be dealt with by an Inspecting officer who would check and verify the Patwari records. It was estimated that this would cost about another Rs. 2,000/- which also the Committee was prepared to pay. The Government of Assam was therefore addressed on these lines. That Government accepted the proposal and arranged at once for the census of the jute area in the Sylhet district. It was, however, not able in 1937 to arrange for the survey of the jute growing areas of the temporarily settled tracts but proposed to get that work done in 1938 along with the actual survey of the Goalpara district.

In January, 1938, the Government of Assam reported that it had not been possible to complete the jute census of the Sunamganj Sub-Division of the Sylhet District because floods stopped the work, but it supplied a revised figure arrived at as a result of the census of the rest of the district. This showed an area of about 30,000 acres of jute in the portion of the Sylhet district so far surveyed, while the forecast for the Sylhet district in 1936 was 13,300 acres. When these figures were considered by the Indian Central Jute Committee at its third meeting in February, 1938 it was decided to ask the Government of Assam for a detailed report from the Deputy Commissioner of the Sylhet District on the methods used in collecting the revised figures and in checking these. It is this report which is now before this Jute Census Committee.

The cost of this census in the Sylhet district covering a total jute area of approximately 37,000 areas has been Rs. 10,260/- or approximately three acres per rupee. On this basis, the cost of a census of the jute area of Bengal, if this totals 2 million acres, should be about 7 lakhs of rupees. As against that figure, the census carried out in the Purnea district of Bihar in 1936, which recorded 450,000 acres of jute, was stated to cost Rs. 7,000/- only. On this basis, the census of the Bengal jute area should not cost more than half a lakh of rupees. But from an examination of the Railway figures for the movement of jute from Bihar it is doubtful if the figure arrived at by the Government of Bihar as a result of its survey is not very seriously over-estimated. The Committee is therefore greatly interested in the accuracy of the reports provided by this method of survey.

From the report before the Committee it seems that the Government of Assam placed one Sub-Deputy Collector in each Sub-division in charge of the survey work on jute in addition to his usual duties. That Officer after local enquiries divided the jute area into a number of fairly uniform units and employed amins to record the actual jute plots sown in each unit. In some cases plots were measured with survey instruments and in some cases with Luggies. A certain number of temporary Kanungoes were employed to check the work of the Amins, and the check seems to have been by a re-survey of a small proportion of the plots. The resulting area figures were compiled and Mouza lists prepared, showing plots of jute and names of the growers. Except the percentage of check by the Kanungoes referred to, no further check seemed possible, and there is at present no means of ascertaining as to how far the Mouza lists of growers and plots are accurate.

The subject is for the consideration of the Committee.

ENCLOSURE TO APPENDIX III.

Copy of letter No. 5095-R., dated the 7th May 1938, from the Deputy Commissioner, Sylhet, to the Director of Agriculture, Assam, Shillong.

Methods used in collecting the revised figures of jute growing areas in the district of Sylhet.

I have the honour to refer to the correspondence resting with your letter No. XA-94/69 dated the 29th April/38 on the above subject and to say at the outset that the district (excepting the Jaintia parganas where jute is grown in a very limited scale,—the total area under the crop being about 50 acres only) is not a cadastrally surveyed one and as such no record of rights are available. Again jute is not grown in this district in compact blocks but in a scattered way all over the subdivisions. The area cropped varies almost every year according to circumstances.

2. In each subdivision, one Sub-Deputy Collector was placed in charge of the jute survey work in addition to his usual duties. The Sub-Deputy Collector visited the localities and ascertained situations of the jute areas, where necessary with the help of his staff (Supervisor kanungoes and amins), the sarpanches, and other local people and then divided the area conveniently into some units or lots each one being as large as one amin might be expected to cope with. As many temporary amins as there were lots were appointed and were given due instructions before the work was actually started. The temporary amins were supplied with survey instruments obtained from different sources and they carried out survey of individual holdings, scattered or compact, by means of chains and plane tables at the identification of the sarpanches, choukidars or actual occupants aided by the officers of the Agricultural Department. Poles were also sometimes used as is the practice generally followed in the survey of land in non-cadastral permanently settled areas. The survey work in Sunamganj sub-division could not be completed last year and in that connection a reference is invited to this office letter No. 1253-R., dated 11th September 1937. The work has been resumed this year and is in progress now. In Habiganj and Sunamganj sub-divisions where the area was comparatively large, temporary kanungoes besides the

amins had to be appointed to check the work of the Amins under the general supervision of the Sub-Deputy Collectors while at Sadar and south Sylhet the temporary amins appointed for jute survey worked under the supervision of the Ilam Supervisor Kanungoes—their work being also checked at random by the respective Ilam Sub-Deputy Collectors. At Karimganj the work was managed by the permanent Ilam staff because the area in that sub-division is comparatively small. But whenever, in any case, the amins experienced any difficulty it was quickly attended to and necessary help and instructions were given by the Sub-Deputy Collectors and also at times by the officers of the Agricultural Department. As regards the Jaintia parganas which is a surveyed area and where jute is grown for local consumption only, no fresh survey of the jute fields were needed as the acreage there was picked up from regular settlement records and as such are very reliable.

On completion of the field work, area calculation was made by the amins in office on the basis of the field books or other notes kept by them in the field. The amins then prepared and submitted mouzawari lists of the plots under the crop showing the total area in a village as well as the names of the growers. The district having not been previously surveyed cadastrally no authentic old record of jute areas could be forthcoming here for reference and as a matter of fact the present survey was carried out and the area arrived at independently.

APPENDIX IV.

NOTE BY THE SECRETARY ON SUBJECT NO. 4.—*To consider the Scheme of work proposed to be undertaken by the Jute Census Committee during 1938.*

The attached note enclosure by Prof. P. C. Mahalanobis on the scheme for the improvement of the jute forecast is circulated for the information of members of the Jute Census Committee. The various points that arise and require settlement in order to enable the work to be begun at a very early date are thought to be as follows :—

(1) The scope of the work to be undertaken during the present year. Prof. Mahalanobis's suggestions are in Paragraph 16. It is for consideration how many of these districts it will be possible to work in during August and September, taking into consideration the flooding.

(2) The exact organisation which will be necessary to carry out the work. Prof. Mahalanobis's proposals are : 1. Statistical Adviser in charge of the whole work with Statiticians in direct charge of the statistical side and a Field Supervisor in charge of the field side. It is doubtful if we can improve on this though it is for consideration to whether the Field Supervisor we propose to employ working on a part-time basis only, will in fact be able to deal with all the administrative details as promptly as the work will require. This administration of the field staff is probably the crux of the whole matter and, it is thought, requires special consideration.

(3) The question of accommodation for the Statistical and Office staff employed directly on this work should also be clearly settled.

(4) The suggested budget possible requires some amendment and, in this connection, it should be settled at once what allowance is to be paid to the Statistical Adviser and also what allowance shall be paid to the Field Supervisor. Under these two heads of the abstract budget, some reduction seems possible and it is thought that any reduction that is possible should be added to the provision for Travelling allowance and Contingency.

(5) *The time-table of work.*—The Indian Central Jute Committee desires that the report on this experimental work to be done during 1938, should be made available by the 31st December, 1938. Prof. Mahalanobis indicates that this report should be ready by the beginning of October. It is thought that it will be necessary to arrange a very rigid time-table and to undertake only so much work as can be safely fitted into that time-table. The following is suggested :—

(i) To settle the organisation with administrative details at the committee's first meeting and to complete the recruitment and training of Inspectors by the end of July. During this time also the preparatory statistical work *e.g.* preparing of grids etc. should be completed.

(ii) August and September to be occupied by field work by the Inspector's staff and the primary investigators, all the field work to close down on the 30th September. The order in which work in the different districts should be taken up should be indicated.

(iii) Computations and calculation work can begin during September and should be completed without fail by the end of October.

(iv) The Report should be available, say, by the middle of November.

(v) Part of November and the whole of December would remain in which to obtain the concurrence of the Indian Central Jute Committee and the Government of Bengal to the work to be undertaken during 1939 so that the work for that season would begin from the beginning of January, 1939.

The subject is for the consideration of the Committee.

ENCLOSURE TO APPENDIX IV.

*Note on the Scheme for Improving the Jute Forecast;
The Exploratory Survey of 1938.*

BY P. C. MAHALANOBIS

Introduction.

Before discussing the programme of the proposed Exploratory Survey it will be convenient to consider briefly the nature of the task confronting us. Our object is to make an accurate estimate of the area under Jute in Bengal. It will be seen from the accompanying Table which gives relevant basic facts) that the total area under Jute is over 21 lakhs of acres (Col. B) or about 3,300 square miles. The chief difficulty in making an estimate however lies in the fact that this area is scattered in 19 different districts over an area of roughly 55,000 square miles. To put the same thing in a different way, there are 70 lakhs of different plots under jute scattered among about 11 crores of individual plots.

Difficulties of a Complete Census.

2. In making an estimate of the area under jute, another difficulty is the peculiar nature of the jute crop. The actual field enumeration has to be completed in the interval between the cessation of sowing and the beginning of harvesting. Jute being an exceptionally short crop, this allows barely two months to complete the work in any given area. The organization of a complete census is therefore a formidable task, and will require a large staff of investigators possibly several thousands in number.

3. Apart from the cost which will be large, the organizational difficulties in building up the necessary agency in the course of a year or two are practically insurmountable. It should be remembered in this connexion that, in principle and on paper, a perfect system of complete enumeration is and has been in existence for a long time. In each Union comprising about fifteen mauzas on an average, a detailed report is supposed to be prepared each year giving the name of each individual cultivators and the area sown by him with jute. These returns are then compiled for each thana, and at the next stage for each Sub-division and District in Bengal.

The official estimate is thus based on a detailed complete census conducted every year. Theoretically, the final estimate should therefore be perfectly accurate; and yet in actual fact it is known to be thoroughly unreliable. I need not labour this point further. Merely setting up an organization is not enough. The important thing is to ensure that the work done by the primary investigators should be thoroughly reliable.

Random Sample Survey.

4. In this situation the Random Sample Survey offers the most promising line of advance. But even a sample survey can not be organized in a hurry. Patient experimentation will be necessary for gathering the factual knowledge required to enable a sampling scheme being designed with efficiency. And secondly, it will take time to build up the human agency required for this purpose. The object of the present Scheme may be thus broadly defined as two-fold :—

- (i) to develop and standardize the technical methods for a Sample Survey, and
- (ii) Secondly, to build up the necessary human agency to carry it out in practice.

5. The work of designing a sample survey is a highly technical job, and will require theoretical as well as experimental studies of a difficult kind. It will not serve any useful purpose to enter into technical details, but it will be convenient to give a brief description of the salient features of the sampling method.

6. In the present case the unit of sampling will be an area of a suitable size, which may conveniently be called a "grid". Each grid will be located at random within the region surveyed, and the area under jute in each grid will be ascertained by direct inspection of the plots included within the grids. The efficiency of the sampling can be increased by dividing each district into a number of homogeneous "zones", in each of which a suitable number of sample grids will be located at random. The proportion or total area under jute in each zone will be calculated from the average value of the figures for individual grids, and the final estimate for the district or the province will be prepared on the basis of the

figures for the different zones. One great advantage of the method, apart from its lower cost, is the possibility of calculating the order of accuracy of the final or any other estimate.

*Basic Requirements for Efficient Planning
of a Sample Survey.*

7. The efficient planning of such a random sample survey thus involves, on the technical statistical side, the following steps:—

- (i) Dividing the province into uniform zones.
- (ii) Determination of the best size of the sample grid.
- (iii) Fixing the total number of sampling units or grids.
- (iv) Fixing the number of grids to be allotted to each zone.
- (v) Locating the grids strictly at random within each zone.

8. The total number of sample grids and the number to be allotted to each zone will depend on (a) the accuracy which it is desired to attain in the final estimate, (b) the total area of each zone, and (c) the "variability" or the magnitude of fluctuations from one spot to another of the area under jute within each zone. The greater the "variability" in any given area, the greater must obviously be the number of sampling units to be drawn from this area in order to reach any assigned degree of accuracy in the final estimate. For efficient planning of a Sample Survey, it is therefore necessary to obtain some idea of the variability in different jute growing districts of the province.

9. Questions of cost are also involved in fixing the optimum size and the optimum number of sampling units or grids. The total cost per grid is determined by the time taken for the actual field inspection and enumeration (which will depend on the size of the grid) plus the time taken to move from one grid to another (which will depend on how widely the grids are scattered, that is, on the number or density of grids in a given area). It is clear that these questions can only be settled by direct experimentation on the field.

Experimental Crop Census of 1937.

10. This is why I had suggested the organization of the Experimental Crop Census of 1937. Owing to lack of statistical

guidance at the time of the field enumeration, some of the technical portions of the work was however not properly carried out. This was unfortunate, but in spite of its defects, the Experimental Census of 1937 must be considered to have been fully justified by its results. It furnished a complete record of the nature of the crop (or fallow or any thing else) on each of the 2,83,565 individual plots in two thanas, Deganga and Tarakeswar, covering about 124 square miles. This has enabled model sampling experiments being started in the Statistical Laboratory for studying directly the kind of sampling procedure which it will be necessary to adopt in the present case.

11. The Experimental Crop Census of 1937 has also furnished valuable information about the time and cost of actual field work. But, as this survey covered a compact area, no information could be secured in regard to the time required to move from one grid to another. This point will now have to be investigated; and we shall have to find out, by direct experiments on the field, what area can be covered by a single investigator in one day for different sizes and different densities of sample grids.

Thanas as "sampling zones".

12. The detailed analysis of the results of the 1937 Survey and model scale experiments with different sizes of grids are now proceeding. Although the work is not yet finished I have reached certain tentative conclusions. I believe it will be convenient to adopt roughly the thana as our ultimate zone for sampling. From the accompanying Table (Col. 11) it will be noticed that in a full scale provincial survey we shall have to cover 329 thanas. Some of the thanas are however rather large and heterogeneous in character; and it will be probably desirable to break them up into two or three zones. If this is done, it will give us roughly 400 zones as a working basis for making our plans.

Size of sample grids.

13. From the model sampling experiments which are now proceeding in the Statistical Laboratory, I find that small grids are likely to give a higher accuracy than grids of a larger size. The cost of enumerating scattered grids of a small size will however be proportionately greater than the cost of enumerating compact

blocks of large size. We shall have now to conduct actual experiments on the field to find out which size of grid will give the highest accuracy for a given expenditure.

14. I may mention here that in 1935 Mr. H. P. V. Townend (then Rural Development Commissioner, Bengal) had organised a Sample Survey of the acreage under jute in 19 districts in Bengal. He had used about 2,600 sample grids each of size 40 acres. After a good deal of correspondence I have just succeeded, with Mr. Townend's help, in tracing the original grid figures for this Survey. A copy is being prepared of the records at present. As soon as the material becomes available, I intend conducting a detailed analysis of the results which I am hoping will give us valuable information for planning future work.

Programme of the Exploratory Survey, 1938.

15. On the technical statistical side then the programme of the Exploratory Survey may usefully cover the following points:—

- (i) A complete enumeration of, say, six or eight thanas in important jute districts for studying the variability in different regions and for ascertaining the time and cost of such surveys.
- (ii) Intensive experiments in three or four selected districts for studying how many sample grids can be enumerated per day on an average by each investigator working with grids of different size. Detailed records of cost will be kept in order to compare the accuracy attained by grids of different size for the same expenditure.
- (iii) If time permits, it will be desirable to conduct a test survey with sample grids of the optimum size in a number of thanas, the actual organization of the survey being made as nearly similar as possible to the organization of the full-scale survey proposed to be conducted in 1939.

Selection of Districts and Thanas.

16. In selecting the districts in which the work will be done, a number of factors will have to be taken into consideration such

as (a) the total area under jute, (b) the proportion under jute, and (c) local conditions as regards flooding, means of communication, etc. In selecting the thanas, the proportion under jute and the variability will also have to be kept in mind. Remembering that at this stage our object is to gain experience of as widely variable material as possible, I tentatively suggest the following districts in order of preference for this year's work:—

- (1) Mymensingh; (2) Dacca; (3) Rangpur; (4) Tipperah; (5) Rajshahi; (6) Pabna; (7) 24-Perganas; and (8) Murshidabad.

17. The best procedure in selecting thanas will be to classify them within each district into a number of different groups according to characteristic features, and then to pick up the thanas to be surveyed strictly at random within each group. I shall be in a better position to make detailed recommendations after I have had the opportunity of analysing the results of Mr. Townend's Sample Survey of 1935.

18. After the districts and the thanas have been selected on the lines indicated above, the programme of work will be roughly as follows:—

- (i) Field work on the complete enumeration of selected thanas will be started immediately as this will not involve any special preparation other than procuring the mouza maps which I understand can be done quite quickly
- (ii) For the Sample Survey, grids of different size will be located at random on mauza maps and plots numbers will be extracted on a standard enumeration form. The field enumeration will be started as soon as the sample grids are prepared for one thana, and the work will be extended to other thanas as sample grids for these thanas are made ready.
- (iii) The area of the plots (included in the sample grids) will be copied from khatians and will be checked by direct measurements in the Statistical Laboratory.

- (iv) Compilation and analysis of the field records as well as model sampling experiments will proceed continuously along with other work.

Nature of Organisation required for a Permanent Scheme.

19. In organising the Exploratory Survey it will be desirable to keep in view the staff which will be required in case the work is placed on a permanent basis. Attempts should be made in fact to build up an independent and self-sufficient organization which will not only carry on the work during the experimental period but will be able to take over the Scheme when it is made permanent. It will be convenient therefore to try to visualize the type of organization which is likely to be required three or four years later.

Statistical Organization.

20. Work on the statistical side may be broadly classified under a number of heads:—

- (a) Planning of the survey and general supervision of the work during the experimental period will be done by the Statistical Adviser assisted by the senior workers of the Statistical Laboratory. When the work is made permanent, general advice and guidance will be given by a Consulting Statistician of senior standing.
- (b) Model sampling experiments, analysis of time and cost records, and special investigations will require the services of at least one wholetime statistical worker.
- (c) Statistical work of a more routine type will cover the following items:—
- (i) Preparation of sample grids including their location at random on mauza maps; and the extraction of the number of plots on standardized enumeration sheets on which results of the field work will be recorded.
- (ii) Measurement of the area of individual plots either by copying from the khatian in the Collector's Office or by direct measurement in the Laboratory.
- (iii) Tabulation and analysis of the results of field enumeration.

21. Although general advice and guidance will have to be obtained from time to time from a Consulting Statistician, it is desirable that the day to day work should be conducted by the permanent staff. I think it will be found necessary to employ one Statistical Supervisor, and at least one, but preferably two assistant Statisticians with adequate knowledge of both theoretical and applied statistics. One of the Assistant Statisticians will be engaged primarily on the routine work of preparing sample grids, analysing and tabulating the results of field enumeration, and the preparation of the final estimate for the official forecast. The other Assistant Statistician will work primarily on model sampling experiments and other special investigations, the object of which will be to improve the efficiency of the sampling technique.

22. Under the Statisticians there will have to be a number of Inspectors and Assistant Inspectors for detailed supervision of the computation work. They will have to possess sufficient knowledge of computational work, and ability to scrutinise and check the work of junior computers. Above everything else, they will have to be thoroughly tested for the reliability and accuracy of their work.

23. Then there will be the staff of computers who will have to be gradually trained for the special type of work required in the present Scheme. As a sufficient number of trained computers will not be available immediately, a number of untrained clerks will have to be engaged for this work in the initial stage.

Field enumeration.

24. I may now consider the field work. I have already pointed out that the actual field enumeration will have to be completed within two months in each area. I am unable at present to give any accurate figure regarding the total number of sample grids to be used in the full-scale survey. This will depend on the size of the grid as well as on local conditions in different regions. The sampling experiments conducted so far suggest however that for sample grids of one-acre, the number per zone may easily have to be of the order of 200 or more. The actual number will of course vary from zone to zone depending on the area and proportion under jute. But in any case it is clear that at least one but possibly two, and in some cases even three, primary Investigators will be required

in each zone in order to complete the field enumeration within two months. This means that, with 400 zones, we shall have to employ from 500 to 800 primary investigators in a full scale survey. In order to avoid unnecessary travelling expenses and overhead charges, it will be desirable that these primary Investigators should be all recruited and trained locally, preferably in his own thana in the case of each investigator.

25. The success of the Scheme will depend entirely on the accuracy of the field enumeration. The work of the primary Investigators will therefore have to be carefully supervised by trained Inspectors. Allowing roughly one Inspector to ten Investigators, we shall require from 50 to 80 Field Inspectors when the work is fully organised. These Inspectors will have to be recruited and trained at headquarters, and care will have to be taken to employ only such men as are found to be thoroughly reliable.

Field Supervision.

26. There will be one Field Supervisor who will be primarily responsible for the whole of the field work. He will have to be assisted by at least two but possibly more Assistant Supervisors. Under the Supervisors there will be a staff of Field Inspectors and Assistant Field Inspectors who will have to be trained in the work of field enumeration, and will also have to be thoroughly tested for the reliability and accuracy of their work. Under the Inspectors and Assistant Inspectors there will be several hundreds of primary Investigators who will be recruited and trained locally in each thana and will normally work for only two months.

Necessity of Permanent Staff.

27. The whole of the technical and supervising staff, that is, all the employees except the Village Investigators will be engaged on a permanent basis. This is necessary in order to maintain the required standard of accuracy in the work. The employees will know that if the work is found to be unreliable in any way their services will be almost certainly dispensed with. Although the Village Investigators will be employed for only about two months in the year, they will also know that, if their work is found satisfactory, they will have every chance of being employed in future; on the other hand, if the work is not up to mark, they will not be employed again.

Importance of Training.

28. It will be noticed that an essential condition of success is the proper training of the workers of different grades. Obviously this work will have to be started from the top. The first thing necessary therefore is to give the necessary training to the Statisticians and the Field Supervisors. This will naturally be one of most important objects of the Exploratory Survey on the organisational side. Attempts will also have to be made to train as large a number as possible of Inspectors and primary Investigators during the course of the Exploratory Survey this year.

29. It is not suggested that the Supervisors and Assistant Supervisors can be fully trained in the course of one season. (In fact one reason for having a Four-Year Scheme as proposed later, is to allow enough time for the supervising staff to gain sufficient experience to be able to take over the work when it is made permanent). It cannot however be emphasised too much that without the experience to be gained during the Exploratory Survey this year it will be altogether impossible to organise and conduct a Survey on a provincial scale in 1939.

Detailed Proposals for the Exploratory Survey.

30. I shall now consider the detailed proposals for the Exploratory Survey of this year. As the basic idea of the present scheme is mine, it will be desirable I think to arrange that the general planning and superior direction of the survey should be done by me during the experimental period. I have already suggested to Government that I should be allowed to take up this work on a part-time basis and to draw a special duty allowance for this purpose (as I used to do at one time when I was working as Meteorologist, Calcutta, in addition to my duties in the Presidency College).

Statistical Section.

31. As regards statistical supervision I propose the following arrangements. Two or three trained Statisticians will be put on the work on a whole-time basis, and one or two other statistical workers will be associated with it on a part time basis. This is necessary and desirable for several reasons. Owing to the lack of trained Inspectors, a great deal of the work of routine supervision of computation and tabulation will have to be done in the beginning

by statistical workers. Secondly, a good deal of theoretical investigations will have to be undertaken in the experimental stage for which it will be convenient to have at our disposal a larger number of statistical workers than will be ultimately necessary when the technique is fully standardized. Finally, it will be desirable from a purely administrative point of view to associate a large number of younger workers in the initial stage. This will give a wider choice in making the final selection in the course of the next two, three or four years. I am providing Rs. 1,000 per month for allowances to statistical workers including the duty allowance for the Statistical Adviser.

32. On the statistical side we shall require about five or six Inspectors and Assistant Inspectors on allowances varying from Rs. 50 to Rs. 100 per month for supervising the work of (a) preparation of sample grids, (b) measurement of areas of plots, and (c) analysis of results of field enumeration and sampling experiments respectively. Allowing six junior computers and clerks on a monthly salary ranging from Rs. 30 to Rs. 50 for each of these sections, we shall require a staff of eighteen clerks on an average pay of Rs. 40 per month. Two typists and general assistants will also be required for the general administrative work.

Field Section.

33. As regards the field work we shall require one Supervisor (preferably Mr. Nihar Chandra Chakravarti of the Bengal Civil Service, who has previous experience of this type of work, and about whom I have already written to Government), and two or three Assistant Supervisors. I have already suggested that one or two Government officers should be placed on deputation for this purpose. In the initial stage it will be a great advantage to have Government officers associated with the field work, as they will be more easily able to secure the active co-operation of Circle officers and other officials in the districts. There is, however, also some risk in depending entirely on Government officers placed on deputation for this purpose. They cannot be counted upon to continue this work, as they may prefer to revert to their own posts in case they do not find the jute work to be congenial or consider it to be not sufficiently alluring in regard to future prospects. It will be desirable therefore

to have at least one Assistant Supervisor from outside Government service.

34. I am unable to give details of allowances for field supervision, but from informal talks I believe it will suffice if we provide Rs. 1,000 per month for this purpose.

35. I am hoping that it will be possible to recruit and train about ten Field Inspectors and Assistant Inspectors on an average salary of Rs. 75 per month. Adding six similar posts for the statistical work, I am providing for 16 posts of Inspectors and Assistant Inspectors.

36. The supervising and inspecting staff proposed above will have to be employed for the duration of the Exploratory Survey, *i.e.*, for six months. In fact they will be recruited on a semi-permanent basis with the idea that they will be absorbed in the Scheme for 1939 and succeeding surveys.

37. As regards primary investigators, my proposal is to recruit one or two men in each thana, so that they will do their work within the thana in which they are residents. It should be possible I think (but this point also will have to be settled experimentally by the method of trial and error) to get the right type of men on an average allowance of about Rs. 25 per month. As they will work for only two months, this will mean Rs. 50 per primary investigator. If we succeed in training ten Field Inspectors, it may be possible to have a total staff of say 100 Investigators. I am therefore providing Rs. 5,000 for this purpose.

38. As regards travelling expenses, it is proposed that Inspectors and Assistant Inspectors should be paid actual fares from headquarters to districts and back on headquarters, but will have to do the travelling within the district at their own expense. The Supervisor and Assistant Supervisors however will have to inspect the work in all the districts. I am therefore providing Rs. 3,000 for travelling expenses.

39. I understand that two additional rooms will be made available in the Presidency College for the Jute Census work. If this is done, it will be not necessary at present to hire additional rooms outside the College. No provision is therefore made for

house-rent. Adding Rs. 3,000 for contingency, the abstract Budget comes out as follows.

Abstract Budget for the Exploratory Jute Survey, 1938.

	per month. Rs.
(I) <i>Supervision of Statistical Work</i> : (including allowance of Statistical Adviser)	1,000
(II) <i>Supervision of Field Work</i> : Field Supervisor (1), Assistant Supervisors (2)	1,000
(III) <i>Inspectors and Assistant Inspectors</i> (Rs. 50-100) 16 posts X Rs. 75/- (average)	1,200
(IV) <i>Computers, typists, and general assistants</i> (Rs. 30-50) 20 posts X Rs. 40/-(average)	800
	<hr/> Rs. 4,000 <hr/>
	for six months—Rs. 24,000
(V) <i>Village Investigators</i> (Rs. 25/-per month) 100 posts X Rs. 50/- (two months)	Rs. 5,000
(VI) <i>Travelling</i>	Rs. 3,000
(VII) <i>Contingency</i>	Rs. 3,000
	<hr/> Total Rs 35,000 <hr/>

Overhead Expenses.

40. The supervising and overhead expenses are naturally disproportionately large at this stage of the work. This is inevitable, for until the required number of Inspectors can be trained, it will be useless to try to appoint and control a large number of primary Investigators. As the work develops, Inspectors and Investigators will be appointed in increasing numbers, until the greater part of the money will be spent on the field enumeration. At this stage, our chief aim is to organize the essential frame work for the whole project.

Possibility of Extending the Field Work.

41. It will be noticed that an essential feature of my plan is that each Field Inspector (who will be placed in charge of five or six thanas) will be recruited and trained at headquarters and that it will be primarily his duty to train and supervise the work of the primary Investigators who will be recruited locally. It will be seen therefore that the number of primary Investigators who can be appointed or, what comes to the same thing, the number of thanas which can be covered, will depend entirely on the number of Inspectors whom we can recruit and train during the next few weeks.

Additional Grants.

42. With eight or ten Field Inspectors it should be possible to cover from thirty to fifty thanas. In case we succeed in training a larger number of Inspectors, it will be possible and obviously desirable to extend the field work to other thanas. If the work progresses satisfactorily we may therefore have to ask Government for an additional grant for this purpose. As the overhead expenses will remain appreciably the same it will be possible to do this at a comparatively small cost. If the work progresses sufficiently quickly and smoothly, we may therefore require another fifteen or twenty thousand rupees to complete the work this year. This is an upper limit.

43. Everything will however depend on how the work actually progresses. In fact, if we do not succeed in getting a sufficient number of reliable Inspectors, the question of extending the field work will not arise at all, and there will be no need of asking for additional grants.

Plans for the Future: the 1939 Survey.

44. I may however anticipate a little in regard to the 1939 Survey. Whatever be the size of the sample grid, it is clear that a very large number of sampling units will have to be used in order to attain a reasonable standard of accuracy. If we work with one-acre grids, this number may easily be 80,000; if we work with a larger size of grids the actual number will be less, but the time taken for preparing the sample grids will be about the same, or may even be a little greater. On the basis of the work which has already

been done in the Laboratory I find that roughly two man-months will be required for preparing about 1,000 one-acre sample grids. With 80,000 grids, it will require 160 man-months altogether to get things ready for starting the field enumeration. Even if we employ 20 clerks for this purpose the preparation alone of the sample grids will take roughly eight months.

45. It is of course not possible to organise the work on this scale in 1939. We must however make an attempt of covering at least, say, 25,000 sample grids in the first year of work on a provincial scale. This means 50 man-months of preliminary work before the field enumeration can begin. We may be able to put on ten or twelve men on this work this year. It will not be possible to put on more men in the course of the next six months as the work of preparing sample grids requires a good deal of training and experience. The quality of work has also to be maintained at a high level of accuracy; this requires a stringent selection of workers which takes time). The preparation of the sample grids of the 1939 Survey will thus take at least four or five months.

Work on 1939 Survey must begin in November.

46. Sowing in some of the important jute districts like Mymensingh or Dacca will be completed by the end of April, and the ground will remain dry only up to about the middle or end of June. It is necessary therefore that the field enumeration should be started in such districts by the beginning of May, as otherwise the success of the whole survey will be jeopardised. In order to enable this being done, the actual mauza maps and the enumeration sheets for the sample grids must reach the primary Investigators by the end of April. It is necessary therefore that the work of preparing the sample grids should be started by the end of November 1938. This requires that administrative sanction for the scheme will have to be obtained at the latest by the beginning of November. If this is not done, either the idea of a full scale provincial survey in 1939 will have to be abandoned or a good deal of money and energy will be wasted in a futile attempt to do the work without adequate preparation.

47. It will be desirable therefore for the Jute Census Committee to keep in view the need of submitting their proposals for the

1939 Survey by the beginning of October at the latest for consideration and final decision by Government.

Need of a Four-Year Scheme.

48. The Exploratory Survey of 1938, I should like to emphasize, is an integral part of the Scheme for improving the jute forecast. In fact, it is simply a necessary preliminary to the organisation of a full scale Survey in 1939. Its primary object is, on one hand, to collect the basic material required for planning the 1939 Survey, and secondly to make a start in building up the human agency. If the 1938 experiment proves successful, the next step will be laying down a Four Year Scheme extending from 1939 to 1942 for developing an adequate technique of sample survey and for building up the organisation required to carry it out in practice.

Possibility of a Complete Census.

49. Once the organisation necessary for a full scale sample survey is consolidated, it will be possible to consider plans for a Complete Census. In fact it should not be then difficult to extend the work within a comparatively short time to attempt this. It will be then also possible to consider profitably the question of securing detailed information for giving effect to any scheme of compulsory restriction of the acreage under jute.

Concluding Remarks.

50. I have given above concrete proposals which I believe to be sound in the present state of our knowledge. This does not mean however that considerable changes in our plan will not be necessary in future. I should like to emphasize that my own approach is primarily experimental. We are exploring unknown territory; and it will be idle to give a cut and dried scheme. Each step, on the statistical as well as on the organisational side, must be allowed to be determined completely by the previous one. It is therefore essential that Government and the Jute Committee should treat the whole Scheme as a big experiment, and should be prepared to provide such facilities as may become necessary as the work progresses.

(Sd.) P. C. MAHALANOBIS.

Dated 26th June 1938.

Table showing Acreage under Jute in Bengal and connected data.

Serial No.	Name of District.	Total Area.		Total No. of		Area under jute.			Accumulated totals.			Accumulated totals for jute.		
		in 1000 acres.	in sq. miles.	Thanas.	Mauzas.	in 1000 acres.	percentage of		Area in sq. miles.	Number of		Area in 1000 acres.	Percentage of	
							District.	Total area.		Thanas.	Mauzas.		District.	Total area under jute.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Mymensingh ...	3,991	6,237	24	8,317	566	14.2	26.0	6,237	24	8,317	566	14.2	26.0
2	Dacca ...	1,733	2,713	13	5,250	265	15.3	13.0	8,950	37	13,567	831	14.5	39.0
3	Rangpur ...	2,237	3,496	18	4,072	252	11.2	12.0	12,446	55	17,639	1,083	13.6	51.0
4	Tipperah ...	1,661	2,597	12	4,177	183	11.0	8.0	15,043	67	21,816	1,266	13.2	59.0
5	Faridpur ...	1,508	2,356	13	3,631	150	9.9	7.0	17,399	80	25,447	1,416	12.7	66.0
6	Rajshahi ...	1,669	2,609	14	4,615	91	5.4	4.0	20,008	94	30,062	1,507	11.8	70.0
7	Bogra ...	885	1,384	12	2,195	85	9.6	4.0	21,392	106	32,257	1,592	11.6	74.0

8	Pabna	...	...	1,166	1,818	17	2,446	80	6.9	4.0	23,210	123	34,703	1,672	11.3	78.0
9	Jessore	...	...	1,858	2,102	24	3,592	70	3.7	3.0	25,312	147	38,295	1,742	10.4	81.0
10	24 Parganas	...	...	3,108	5,257	38	3,266	61	1.9	3.0	30,569	185	41,561	1,803	9.1	84.0
11	Dinajpur	...	...	2,527	3,948	15	6,577	59	2.3	3.0	34,517	200	48,138	1,862	8.3	87.0
12	Noakhali	...	...	972	1,518	14	1,698	50	5.1	2.0	36,035	214	49,836	1,912	8.2	89.0
13	Nadia	...	...	1,781	2,881	25	2,401	36	2.0	1.7	38,916	239	52,237	1,948	7.8	90.7
14	Hooghly	...	...	768	1,188	14	2,180	34	4.4	1.6	40,104	253	54,417	1,982	7.7	92.3
15	Jalpaiguri	...	...	1,876	2,932	8	768	32	1.2	1.5	43,036	261	55,185	2,014	7.3	93.8
16	Bakarganj	...	...	2,254	3,523	16	2,968	32	1.4	1.5	46,559	277	58,153	2,046	6.8	95.3
17	Khulna	...	...	3,001	4,689	22	2,149	31	1.0	1.5	51,248	299	60,302	2,077	6.3	96.8
18	Maldah	...	...	1,271	1,764	10	2,323	30	3.4	1.4	53,012	309	62,625	2,107	6.1	98.2
19	Murshidabad	...	...	1,320	2,091	20	1,829	21	1.6	1.0	55,103	329	64,454	2,128	6.0	99.0
20	Other Districts	...	...	...	...	...	...	14	...	0.9	...	...	...	2,142	...	100.0
	TOTAL	...	...	...	...	...	...	2,142	...	...	...	...	...	...	...	...

APPENDIX V.

SUPPLEMENTARY NOTE BY THE SECRETARY ON SUBJECT NO. 4.—*To consider the Scheme of work proposed to be undertaken by the Jute Census Committee during 1938.*

SUPPLEMENTARY NOTE.

The Secretary has been endeavouring to get worked out with Prof. Mahalanobis the detailed costs covered by the abstract budget estimate supplied at page 15 of the note on experimental work for 1938.

Prof. Mahalanobis's last proposals are below :—

1. "For several years (from 1921 to 1926) I held the post of Meteorologist in charge of the Alipore Observatory in addition to my duties as Professor in the Presidency College, Calcutta. In 1926 I used to draw an allowance of Rs. 300-30-450 besides free quarters for this part time meteorological work. The value of the free quarters (which consisted of the entire upper storey of the Meteorological office standing in its own grounds of about 4 acres of land in Alipore) was at least Rs. 300 per month. My total emoluments when working as part-time Meteorologist more than twelve years ago was thus at least Rs. 600-30-750.

The work in connection with the Jute Census Scheme will not be less arduous or less responsible in character. The Alipore Observatory was an well-organised office, over fifty years old, with trained and experienced employees. The Jute Census Scheme on the other hand, will involve planning of a survey of an altogether new type, training the entire staff beginning with the statisticians and field supervisors, and the building up of the whole organization from its very foundations. It will call for technical knowledge and experience of a highly specialized kind, and powers of organization of a superior type. The amount of work will also be heavy. The total staff in the Meteorological Office was about 35. In the Jute Census Scheme, the staff at headquarters alone will be larger than this. An allowance of Rs. 600-30-750, which is equivalent to what I used to get twelve years ago for the part-time work as Meteorologist, would not have been unreasonable. I however suggested an allowance of Rs. 500 per month.

Allowances to junior statisticians will require another Rs. 500 per month. The total cost of statistical supervision for the Exploratory Survey in this plan will thus be Rs. 500 (part-time allowance) plus Rs. 200 (for junior demonstrator) plus Rs. 500 (allowances to junior statisticians) or Rs. 1200 per month altogether. It should be remembered in this connection that if my whole-time services had been requisitioned as originally proposed, the cost would have been at least Rs. 2,200 or Rs. 2,300 per month. From the point of view of the Jute Census Committee, there

cannot therefore be any reasonable objection to the above proposal. In fact, in this plan there will be a saving of about Rs 1000 per month for statistical supervision.

2. "In view of the fact that the Scheme for the Exploratory Survey has already received Government sanction, I am submitting an alternative proposal in case my suggestion in regard to the part-time allowance is not accepted. I offer my services, for the next six months, in a purely honorary capacity, on the following conditions :—

(a) A donation of Rs. 1500 earmarked for Sankhya, the Indian Journal of Statistics, will be given to the Indian Statistical Institute out of the savings of the current scheme for the statistical analysis of the results of the Experimental Crop Census of 1937.

(b) Rs. 1000 per month will be contributed for six months to the Indian Statistical Institute in consideration of which I shall undertake, as Secretary of the Institute, to make all necessary arrangements for statistical supervision (my own work being of course entirely honorary). The allowances to the statisticians will be paid by the Institute, so that the cost to the Jute Census Committee will be same in either plan. Other arrangements as regards rooms in the Presidency College, relieving me of a portion of the purely routine duties etc. will have to be same as in the other plan.

3. "I have made two alternative proposals, I earnestly hope one of them will be approved by the Jute Census Committee. If, however, for any reason neither of them are considered acceptable, I would suggest that independent arrangements should be made for the statistical portion of the work. In this case if desired, I shall be glad to help in the work as a member of the Committee in a purely advisory capacity, but it will not be possible for me to undertake any special responsibility in this connexion. Or, if it is preferred, I shall be glad to resign my seat on the Committee."

As regards I.—The allowances are considered unduly high.

2. Amounts to the Committee's paying the same amount per month with the feeling that the amount is decidedly higher than necessary. There is also an additional contribution of Rs. 1500/- to the Statistical Journal.

3. Entails the Committee working out a fresh programme of work and providing its own staff Statistical and field.

This will entail considerable delay and missing this season's jute crop but seems the soundest procedure in the end.

APPENDIX VI.

D. O. No. Dj/173/72-4

Statistical Laboratory,
Presidency College,
Calcutta.Darjeeling
4th, July, 1938.

Calcutta, 5th July, 1938.

MY DEAR CLIFF,

I have given a hurried reply to your D. O. No. 1404/38 of the 2nd July 1938. I should like to explain my position quite clearly in regard to the question of part-time allowance.

2. I was told by Mr. Graham that there was a proposal for seconding me for the Jute Census Scheme on a whole-time paid basis. For reasons explained to Mr. Graham, and also in my D. O. No. DJ/23 of the 14th May 1938 to Mr. Bottomley, the Director of Public Instruction, I was unable to agree to this proposal.

3. Although the Jute Census Scheme would involve a good deal of difficult and responsible work, still I did not think that it would require my whole-time services. To place me on deputation for this work would be therefore uneconomical. Besides this, I have other work of importance in hand both on the research and applied side with which I should not like to lose touch. I therefore suggested that the best plan would be for me to take up the Jute work on a part-time basis in addition to my duties in the Presidency College, and that a special allowance should be sanctioned for this purpose. Although I would be working on a part-time basis, I would of course give as much time as would be necessary for the Jute work. In fact, in this plan the Jute Census Committee would get just the same service from me as in a whole-time arrangement.

4. I pointed out in my letter to Mr. Bottomley that there was an excellent precedent for the proposed part-time arrangement. For several years (from 1921 to 1926) I held the post of the Meteorologist in charge of the Alipore Observatory in addition to my duties as Professor in the Presidency College, Calcutta. In 1923 I used to draw an allowance of Rs. 300—30—450 besides free quarters for this part-time meteorological work. The value of the free quarters (which consisted of the entire upper storey of the Meteorological office standing in its own grounds of about 4 acres of land in Alipore) was at least Rs. 300 per month. My total emoluments when working as part-time Meteorologist more than twelve years ago was thus at least Rs. 600—30—750.

5. The work in connexion with the Jute Census Scheme will not be less arduous or less responsible in character. The Alipore Observatory was an well-organized office, over fifty years old, with trained and experienced employees. The Jute Census Scheme, on the other hand, will involve planning of a survey or an altogether new type, training the entire staff beginning with the statisticians and field supervisors, and the

building up of the whole organization from its very foundations. It will call for technical knowledge and experience of a highly specialized kind, and powers of organization of a superior type. The amount of work will also be heavy. The total staff in the Meteorological Office was about 35. In the Jute Census Scheme, the staff at headquarters alone will be larger than this. An allowance of Rs. 600—30—750, which is equivalent to what I used to get twelve years ago for the part-time work as Meteorologist, would not have been unreasonable. I however suggested an allowance of Rs. 500 per month.

6. Allowances to junior statisticians will require another Rs. 500 per month. The total cost for statistical supervision for the Exploratory Survey in this plan will thus be Rs. 500 (part-time allowance) plus Rs. 200 (for junior demonstrator) plus Rs. 500 (allowances to junior statisticians) or Rs. 1,200 per month altogether. It should be remembered in this connexion that if my whole-time services had been requisitioned, as originally proposed, the cost would have been at least Rs. 2,200 or Rs. 2,300 per month. From the point of view of the Jute Census Committee, there cannot therefore be any reasonable objection to the above proposal. In fact, in this plan there will be a saving of about Rs. 1,000 per month for statistical supervision.

7. I should now like to add a few words of explanation of a personal nature. For more than fifteen years I have done a good deal of statistical work for the Government of Bengal as well as the Central and other Provincial Governments and Indian States. All this work has been done in a purely honorary capacity; and up till now I have never asked for nor accepted any honorarium or remuneration for my statistical work. On the contrary, I have spent a good deal of money, over twenty-five or thirty thousand rupees, out of my own pocket for the advancement of statistical studies. I have a high opinion of the value of the services which a statistician can render. It is not therefore possible for me to accept any remuneration for statistical work unless it be consistent with my status as a statistician.

8. I should like to recall here the previous history of the present scheme. In 1935 I suggested a random sample survey for improving the estimates of acreage of yields of different crops. Sir John Russel discussed this question with me during his visit to Calcutta, and noted in his "Report on the Working of the I.C.A.R." (p.16): "It seems desirable to make a sample survey to test as far as possible the accuracy of the present methods (of crop estimates) and the possibility of improving them. Professor Mahalanobis has suggested a scheme for doing this which deserves serious attention." No action was however taken at that time. In March 1937 Mr. Carbery saw me in connection with the Jute Census Scheme. Since then I have had many discussions with him personally and through correspondence. In August 1937, I explained the basic ideas of the scheme at the meeting of the Indian Central Jute Committee, and it was at my suggestion that the Explanatory Survey of 1937 was undertaken last year.

9. At the time of the field work, however, it was not possible for me to undertake any definite responsibility in connection with the experimental Census as it was not considered necessary to give me essential facilities for this purpose such as a telephone or a room in College for computation work. In consequence, some of the objects with which I had planned the experiment were frustrated, and the analysis of the results was delayed by over six months. This was partly my own fault. I believe, in my zeal, I had allowed an impression to be created that permitting me to help in the scheme would be doing me a personal favour.

10. During all this time, the idea of any remuneration for my work had never occurred to me. As a matter of fact, since last year I have already put in a great deal of work in the present connexion in a purely honorary capacity. The proposal to place me on deputation on a whole time paid basis for this work originally emanated from the Secretariat. It was only in this situation and for reasons already stated, I made the suggestion of a part time allowance.

11. I may mention here that I am also keeping in mind the fact that in the case of members of my own as well as other All-India services, special allowances of Rs. 400 or Rs. 500 are quite usual for work of a much less technical nature. I am unable, by any action of my own and for my private gain, to place statistics in a less favourable position.

12. In view of the fact that Scheme for the Exploratory Survey has already received Government sanction, I am submitting an alternative proposal in case my suggestion in regard to the part-time allowance is not accepted. I offer my services, for the next six months in a purely honorary capacity, on the following conditions :—

- (a) A donation of Rs. 1500 earmarked for Sankhya, the Indian Journal of Statistics, will be given to the Indian Statistical Institute out of the savings of the current scheme for the statistical analysis of the results of the Experimental Crop Census of 1937.
- (b) Rs. 1000 per month will be contributed for six months to the Indian Statistical Institute in consideration of which I shall undertake, as Secretary of the Institute, to make all necessary arrangements for statistical supervision (my own working being of course entirely honorary). The allowances to the statisticians will be paid by the Institute, so that the cost to the Jute Census Committee will be same in either plan. Other arrangements as regards rooms in the Presidency College, relieving me of a portion of the purely routine duties etc. will have to be same as in the other plan.

13. I have made two alternative proposals. I earnestly hope one of them will be approved by the Jute Census Committee. If, however, for any reason neither of them are considered acceptable, I would suggest

that independent arrangements should be made for the statistical portion of the work. In this case, if desired, I shall be glad to help in the work as a member of the Committee in a purely advisory capacity, but it will not be possible for me to undertake any special responsibility in this connexion. Or, if it is preferred, I shall be glad to resign my seat on the Committee.

14. You have stated in your letter that you "do not want a serious difference of opinion between us on this point to prejudice our cooperation in this work." I am deeply grateful to you for your most friendly help and co-operation, and I should be sorry indeed to do anything to jeopardize this in future. But I feel the position I have been obliged to take up is reasonable and necessary in the best interests of the cause which is nearest my heart. I do not see any prospects of statistics playing its legitimate part in schemes of national welfare until its value is properly appreciated. An expenditure of Rs. 1,200 per month for the entire work of statistical planning and supervision is, in my opinion, an extremely moderate amount for a big scheme of the present kind. Convinced as I am of the essential need of statistics for the future progress of our country, I must be excused if I am unable to agree to statistical services being assessed at too cheap a rate.

15. There is no compulsion. I have given three alternative proposals, and the Committee is free to choose any one it likes. I want to make it clear that I have no preferences in this matter. If the first plan is approved and I am given a part-time allowance, I shall be glad for I am not less covetous of earthly possessions than other men. If the second plan is approved and a contribution is given to the Indian Statistical Institute, I shall be equally glad for it will give me an opportunity of organizing certain things which I have not been able to do for lack of funds. If the third alternative is preferred, I shall also be glad for reasons of health; I have been heavily worked for a long time, and have had not any holiday or vacation for ten years; it will give me much needed rest and leisure for scientific studies. The question may therefore be settled entirely in accordance with the convenience of your Committee.

16. I had written the above note at Darjeeling, but was waiting to have a talk with you this morning in Calcutta as previously arranged. After discussing the question with you, I am sorry, I am still unable to fall in with your suggestion. I have therefore nothing to add to the above note so far as the main question is concerned.

17. I have already explained to you that I would have been glad if you could have decided the question yourself and made your recommendations to your Committee accordingly. But I understand that my letter is likely to be placed before the Committee to-morrow. Although I have no objection to discussing this matter personally with the other members of the Committee, they may feel embarrassed by my presence. I am therefore thinking of staying away from the meeting of the Committee to-morrow

until this question is decided. I shall be in College, however, and shall be ready to come to the meeting in case my presence is desired at any time.

Yours sincerely,

Sd. P. C. MAHALANOBIS.

A. P. Cliff, Esq . I.A.S.,
Secretary, Indian Central Jute Committee,
Council House Street,
Calcutta.