

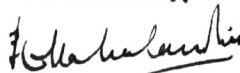
No. C602/13:

Statistical Laboratory,
Presidency College, Calcutta,
24 April 1946.

Dear Dutt,

I apologise for the great delay in submitting the Report on the Bengal Crop Survey : 1944-45. I have just looked through the typed copy in draft form. As I am going abroad tomorrow, I shall not be able to see the report in its final form before my departure. I am asking my office to send you the copy after it is typed with this covering letter.

Yours sincerely,



(P.C. Mahalanobis)

Enclose Report.

S. Dutt, Esq., I.C.S.,
Addl. Secretary to the Govt. of Bengal,
Department of Agriculture,
Calcutta.

Killer Ref : C 606/13 of 15 May 1946

The final report was forwarded to The Bengal Govt
on 15th May 1946. *Shah*

Introduction

The present report relates to the eighth crop survey by sampling method in Bengal. In 1937 work had been started on a five-year scheme for the improvement of statistics relating to jute acreage, financed jointly by the Indian Central Jute Committee and the Government of Bengal. The sampling technique was developed in the course of a gradually expanding series of exploratory surveys culminating in a full scale provincial survey in 1941. The statistical work was done throughout in the Statistical Laboratory under my direct control. The superior administrative control of the field branch was, however in the hands of the Director of Agriculture in 1937. This arrangement did not prove satisfactory and the control of the field branch was transferred to the Secretary, Indian Central Jute Committee in 1938; and the services of a Deputy Collector, Mr. N.C. Chakravarti were made available for looking after the actual work. Mr. Chakravarti continued to remain in charge of the field work in 1939 but the superior control was transferred to the Director of Land Records. In 1940 Mr. Chakravarti was taken away for other work; another Deputy Collector was placed in whole-time charge of the field work; and the administrative control was again transferred to the Secretary, Indian Central Jute Committee. In 1941 when the sample survey was organised for the first time on a full scale covering the whole of the jute-area in the province, both the statistical and field branches were placed under my direct control, and I was given the whole-time assistance of a Deputy Collector.

The five-year scheme terminated with the 1941 survey. The results were considered satisfactory in every way by the Indian Central Jute Committee which recommended its continuance by the Government of Bengal in future. Government, however, decided at first to discontinue the scheme and the whole organization was disbanded. In March 1942 Government reversed their decision and sanctioned the scheme for another year. The whole of the work was entrusted to the Indian Statistical Institute (of which I am the Hon. Secretary); and a block grant was given to the Institute to cover all expenses.

Early in 1943, the scheme for a survey of the jute crop was sanctioned for another year by the Department of Agriculture. Since 1938 I had been pressing unsuccessfully for the extension of the sample survey to cover the aman paddy crop. I was, however, obliged to suspend this work in June under the instruction from the Secretary, Department of Agriculture, who informed me that this Department did not consider it advisable to proceed with the scheme. I then spoke to Mr. Suhrawardy, then Hon'ble Minister, Civil Supplies and orders were issued on the 17th August 1945 by the Department of Civil Supplies sanctioning the sample survey of the Aman paddy crop. This is how in 1943-44 we got the opportunity for the first time of studying the main food crop of the province. Unfortunately, adequate preparatory arrangement could not be made as the season was by that time well advanced, and a good portion of the staff had been disbanded. However, we made whatever arrangements were possible in the short time at our disposal. The Institute received a block grant from the Agriculture Department for the Jute-Aus survey and another block grant from the Civil Supplies Department for the aman survey.

Early in 1944 a scheme for a sample survey of Jute, Aus and Aman paddy in 1944-45 was approved and a block grant to the Statistical Institute of Rs.5.67 lakhs exclusive of dearness allowance, was sanctioned for this purpose by the Civil Supplies Department and the part-time services of Mr. N. C. Chakravarti (Additional Assistant Secretary in the Departments of Revenue and Civil Supplies) were placed at the disposal of the Indian Statistical Institute from February 1944 to take charge of the field branch under my supervision. The field work for the Jute-Aus survey was started on the 1st March. On 24th May, 1944 the Council of Ministers decided to secure estimates regarding Jute, Aus, Aman crops through the Indian Statistical Institute and I was informed to submit a three-year scheme on an enlarged ~~scale~~ scale to ensure information within a small margin of error. On 16 June 1944, I submitted a three-year scheme for the sample survey of crops in Bengal 1944-45 to 1946-47

for which block grants of Rs.7 lakhs in the first year and Rs.6 lakhs for the second and third year, were recommended by the Council of Ministers. The enlarged scheme was finally sanctioned by Government on 25th August 1944.

As the Jute-Aus season was nearing its end at that time, the enlarged scheme was given effect to in the Aman season for which preparatory work was started at the end of May. Mr.N.C.Chakravarti was transferred to the Agriculture Department as Addl. Asstt. Secretary and continued as Superintendent of Statistical Surveys to be in immediate charge of field work in connexion with the scheme.

The present report gives an account of the survey for the year 1944-45 and the results obtained from material collected during the survey. The report consists of six sections arranged in two parts. Part I deals with the survey in the Jute-Aus season and Part II with the survey in the Aman season. Section 1 gives a description of the design or plan of the survey in the Jute-Aus season. Section 2 gives a general account of the survey in the Jute-Aus season and Section 3 gives the actual results of the Jute-Aus survey. Section 4 gives a description of the design of the survey in the Aman season. Section 5 gives a general account of the Aman survey and Section 6 gives the actual results of the survey in the Aman season.

PART I. JUTE-AUS SURVEY 1944-45.

Section 1. Design of the survey.

In order to prepare an efficient design or programme of survey it is necessary to have a good deal of information relating to the intensity of cultivation, i.e. the proportion of land under different crops in different areas; variations in such intensity of cultivation from region to region and the cost of enumeration for different sizes and densities of sample units. We had a great deal of experience of sample survey work in Bengal extending over several years and this helped us in designing our present survey.

Zoning or stratification: Theoretical considerations show that if in a particular area the intensity of cultivation varies appreciably from one part to another then it is advantageous to divide the whole area into a suitable number of zones making each zone as homogeneous as possible. In the case of crop surveys in Bengal the entire area of about 70,000 square miles was stratified into approximately 1150 square zones generated by a system of parallel lines moving East-West and North-South following the existing bearings of the latitude and longitude lines as shown on the district and P.S. maps. Each zone was represented by one-fourth of a degree along the latitudes and longitudes. These zones were recognized as the elements of relatively homogeneous zones. Again from the point of view of organizing the field work the zones served as a convenient unit of coverage of one camp.

Selection of sample-units: Extensive experimental studies have demonstrated that in order to avoid bias, the selection of sample-units must be determined by some process uninfluenced by the qualities of the objects sampled and free from any element of choice on the part of the observer, that is, it must be random. Considerations of cost make it, however, convenient to group the sample-units to some extent in localities selected at random.

This can be done by adopting the method known as multi-stage sampling. In the present case, each zone which was a square with sides equal to 3 miles was divided into 84 cells each of area one square mile and from each zone 14 cells were selected at random. In the second stage, 4 sample-units known as grids, each of area 2.25 acres, were

selected from the chosen cells entirely at random. This size of grid or sample-unit has been found from our previous experience to be the best from the point of view of securing an estimate with a minimum margin of error at minimum cost.

Interpenetrating sub-samples: In order to have some control over the recording mistakes in field enumeration, the total number of grids in each zone was divided into two equal portions Sub-sample (A) and Sub-sample (B). The grids allotted to sub-sample (A) were scattered at random over the whole zone, and in the same way the grids allotted to sub-sample (B) were also scattered at random over the whole area. The two sub-samples (A) and (B) were thus completely mixed up and interpenetrated into one another. The two sub-samples were surveyed by two entirely different parties of investigators and supplied two independent estimates of crop acreage. How far these two estimates were in agreement immediately furnished a good idea about the reliability of the results.

Duplicate grids: A certain proportion of the grids were also intentionally made common to both samples so that they were enumerated twice by the two different parties. A detailed plot by plot comparison of the records for such twice enumerated grids would show how far the primary field work was reliable. The field staff know that a certain proportion of grids were surveyed by both the parties but did not know which grids were duplicated. The very knowledge of the existence of a system of duplicated grids acted as a check on dishonest work.

Collection of information: The investigators were required to go to each plot in the sample-unit and record in a prescribed form the proportion of land under different crops in each plot in terms of annas. Besides Jute and Aus information was collected on some of the other crops of the season and also on land classified under (1) current fallow, (2) old fallow, (3) cultivable waste land, and (4) uncultivable waste land.

Sample selection for crop-cutting: The essential requirement in crop-cutting work is to prepare a design based on the principle of random sampling. It is also necessary to specify the size of each sample-cut, the number of plots for which such sample-cuts are to be selected in each zone and the number and manner in which the sample-cuts are to be collected from each selected plot.

In the Jute-Aus survey the zones were grouped into 60 blocks each containing 16 zones; 4 zones from each block were then selected at random for crop-cutting work. From each selected zone, 4 cells were chosen at random, and from each cell 4 grids were picked up also at random. In each grid, crop-cutting was done in two plots one containing Aus and the other containing Jute. Two cuts were taken in each plot. The size of one cut in each plot was 5.2 x 5.2 sq. ft. and for the other cut the size was 5.2 x 5.2 sq. ft and 10' x 10' in alternate plots. A list of a much larger number of sample-units than that from which the cuts were actually taken was supplied as a precaution against cases of getting plots with no crop at all or plots which were already harvested.

Location of cuts: The workers were supplied with tables of random numbers out of which two numbers were picked up in serial order for each selected plot. The first random number gave the number of steps the worker was to measure along the length of plot from one corner and the second random number gave the number of steps which he was required to take into the plot perpendicular to the length of the plot. The point located in such a way formed one of the corners of the square from which crop was cut.

Records: The workers were required to record in a prescribed form, the actual weight in tolas of the jute plants immediately after harvesting; and in the case of Aus, the weight of paddy after threshing. For convenience of reference these are called "green" weights. The investigators were also required to record the weights of dry paddy after drying the crop for a fixed period of 10 days. Information regarding seeds and manure and also on the nature of ownership of land was collected. During crop cutting the investigators were also instructed to record the proportion of land under different crops in each plot of the grids selected for crop cutting. This supplied material for calculating the acreage under the crop at harvest time and thus to ascertain the difference between the sown and the harvested area under each crop.

Field organisation : The field survey was under the immediate charge of the Superintendent of Statistical Surveys, who with the help of a Deputy Superintendent and 3 Asst. Superintendents supervised the whole of the field operation.

As already stated, the whole province was divided into 60 blocks each consisting of 16 zones; and these blocks were arranged in four Ranges (North, East, South and West Bengal). Each Range was under the supervision of an assistant Superintendent. This was convenient for administration and also had certain advantages from statistical point of view.

In each block two parties each consisting of one inspector and four investigators did the actual survey. The arrangement was that sub-sample (A) would be surveyed by one party and sub-sample (B) by another party at an interval of about fifteen days. Two such blocks with four parties were placed in charge of a chief Inspector. For each pair of two blocks a camp clerk was appointed to remain in charge of a camp office. The inspector in charge distributed the work among his investigators in accordance with certain prescribed principles. Each investigator was supplied with the plot lists of grids allotted to him together with G.S. maps of the villages in which these grids had fallen. The investigators then went to the field with appropriate village maps, identified the plots, and made an actual physical examination of the crops growing on each of these plots and then entered the area-estimates of the proportion of land of each plot under different crops in the appropriate columns in field forms.

As soon as the work in a particular zone was completed the investigator shifted camp to another zone. Usually 6 or 7 days were spent in each zone but occasionally a zone had to be surveyed from 2 or more camps. The inspector in charge was responsible for the accuracy of the work done by his unit and was required to check on the ground at least 15% of the grids surveyed.

Section 2. General Account of the Survey : June - Aug 1944-45.

Location of grids and preparation of field lists : After the preliminary work of sorting of 5 lakhs of map sheets belonging to the field and statistical branches and preparation of a list of missing maps had been finished, the demarcation of zones and cells, and finally the location and stamping of grids were taken up. The sample sheets included in this selection were then assorted in zone-bundles, and separate lists of villages by zones were prepared. Lists of plots for each of about 64000

guides were then prepared and checked. Field copies of these were then prepared in duplicate. The identity of calls to be enumerated twice was kept secret by using various codes. By the end of April all necessary maps, field lists, charts instruction sheets etc. were ready for being despatched to the field.

Field work : The area survey commenced from the first week of May. One of the difficulties of crop surveys in Bengal is that the sowing is completed in different parts of the provinces at different times depending on the first rains of the season. Some parts of these areas again are inundated sometimes between the middle of June and the middle of July and remain under water up to sometime between the middle of October and the middle of November. The difficulty which arises for crop survey is that if the staff is sent to these areas sufficiently early they cannot do the work properly as sowing remains incomplete. If, on the other hand, they are sent late some of the areas may go under water before the survey can be completed.

On the basis of normal rainfall and inundation periods it had been arranged to start work in 24 blocks from about the middle of April but as rain fall was slightly late the commencement had to be deferred till the first week of May. During this time there was an allround competition for getting staff for the various war and allied activities. Many of the trained old workers of the department had gone away to better paid jobs and more were deserting every day so that even in the first week of May work could be started only in 17 blocks for the requisite number of staff not joining up their work. In some of these blocks even, owing to very late rains, the survey could not be carried out satisfactorily for about a fortnight, as all the lands were not sown until that time. Work was started in three other blocks from the middle of May and in a further set of 20 blocks between the beginning and the middle of June when information was obtained that the sowing had been completed in other areas and a fresh contingent of staff had been recruited and trained. Work in the remaining 20 blocks mostly in West and South Bengal started still later, from about the beginning of July as sowings in these areas had not been completed earlier. This reduced the time available for completing the survey of the A and B

sample grids and added to the difficulties of field work. The situation was further aggravated by a large proportion of the field staff falling victims to malaria as the season progressed. A large number of new recruits had to be appointed untrained to fill the vacancies caused by illness and resignations. Details of field survey and progress reports were submitted to Government from month to month.

The survey was finished by the middle of September, but work had to be abandoned in about 4 p.c. of the zones which went under water before the survey of either the A or the B sample grids could be completed in such areas.

Table (1.1) shows by districts the number of sample units in different stages that were surveyed in networks (A) and (B). Col.(2) gives the period of survey. Col.(3) - (5) gives the number of zones, cols. (6) - (8) the number of cells and (9) - (11) the number of grids.

Table (1.2) gives the number of grids surveyed and resurveyed by ranges, while table (1.3) gives the number of grids checked by inspectors and superior officers. It will be seen from col.(10) that the overall proportion of grids checked was 28 p.c. which is quite satisfactory.

As in the case of the area survey, the crop cutting of Jute and Aus was done at different times (varying between end of June and end of September) in different parts of the province. In some of the areas of the East Bengal which are flooded, crops are harvested as early as the second half of June while in some places of West Bengal, the harvesting is done as late as the end of September or even the beginning of October. Apart from such regional variations in the time of harvesting, there are large fluctuations within the same region depending on the growth and maturity of crops. It is, therefore, extremely difficult to adhere to any standard programme of crop-cutting work. It was inevitable that the field staff sometimes arrived at a village or a locality to find that the crop had been already harvested or was not ready for harvest. This naturally dislocated the sampling programme.

The crux of the whole matter is that it is essential that the investigators should watch the crop grow and cut it as soon as ready for being harvested. This means using a large number of investigators who would each, however, work only for a short time. Unfortunately crop cutting

Districts	Period of Survey	No of 200s			No of Cells			No of Grids		
		A	B	Combined	A	B	Combined	A	B	Combined
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1 Backerguzay	7th May to 9th August	38	36	76	301	252	593	1056	976	2032
2 Bankura	10th July to 7th September	36	37	73	321	316	647	1260	1287	2547
3 Birbhum	10th July to 19th September	22	23	45	195	208	403	775	786	1561
4 Bogura	9th May to 25th July	22	22	44	200	185	385	778	702	1480
5 Burdwan	10th July to 19th September	39	43	82	384	362	746	1387	1428	2815
6 Chittagong	14th June to 29th June	12	12	24	81	79	160	301	290	591
7 Dacca	8th May to 5th August	43	43	86	326	305	631	1259	1256	2515
8 Dinajpur	14th June to 22nd June	59	57	116	556	526	1082	2138	2078	4216
9 Faridpur	18th May to 12th August	35	36	76	308	299	605	1151	1070	2221
10 Hooghly	16th June to 6th September	17	20	37	145	166	311	559	600	1159
11 Howrah	16th June to 26th July	7	4	11	80	49	129	305	190	495
12 Jalpaiguri	19th June to 21st September	26	25	51	181	185	366	719	753	1472
13 Jessore	15th May to 4th October	43	43	86	611	593	1204	2395	2203	4598
14 Khulna	14th June to 22nd August	32	32	64	278	287	565	1091	1133	2224
15 Maldah	21st April to 17th September	32	31	63	265	293	558	1055	1152	2207
16 Midnapur	7th July to 16th September	68	69	137	595	604	1199	2218	2149	4367
17 Murshidabad	8th May to 6th September	31	32	63	245	246	491	976	991	1967
18 Nymersingh	8th May to 13th October	94	92	186	777	753	1530	2970	2811	5781
19 Nabadia	8th May to 20th August	42	42	84	376	365	763	1483	1510	2993
20 Noakhali	7th May to 22nd June	16	16	32	129	119	248	479	446	925
21 Patna	7th May to 28th July	26	26	52	219	228	447	881	901	1782
22 Rajshahi	11th May to 10th August	35	35	70	322	325	647	1236	1164	2400
23 Rangpur	1st May to 21st September	57	56	113	467	494	961	1702	1932	3634
24 Tipperah	7th May to 26th June	41	39	80	292	269	561	1084	1007	2091
25 24 Pargana	11th June to 14th July	37	37	74	308	309	617	1227	1222	2449
All Districts	31st April to 13th October	913	912	1825	7982	7637	15809	30487	30037	60524

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Bengal Crop Survey :- July, Aug. 1944-45.

Table (1.2) Statement showing the number of Sample units surveyed and resurveyed.

Range	Number of Grids						Surveyed Twice
	In the Programme			Surveyed once			
	"A"	"B"	Total	"A"	"B"	Total	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
North Bengal	9861	10339	20200	7057	7230	14287	1952
East Bengal	6952	1648	13600	5088	4644	9732	1712
South Bengal	7286	6914	14200	5714	5512	11226	1346
West Bengal	8812	8188	17000	6070	6093	12163	1548
Total	32911	32089	65000	23929	23479	47408	6558

Table (1.3) Statement showing the number of Grids checked by officers of different cadre

Range	Total no Grids			No of Grids checked			Percentage of Grids checked		
	Surveyed & resurveyed		(A+B)	Inspector	Chief Inspector	Total	Inspector	Chief Inspector	Total
	A	B							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
North Bengal	9009	9182	18191	3447	408	3853	21.2	2.5	23.7
East Bengal	6800	6356	13156	2522	619	3441	22.0	5.4	27.4
South Bengal	7060	6558	13918	1832	527	2359	14.6	4.2	18.8
West Bengal	7618	7641	15259	2750	493	3243	20.1	3.6	23.7
	32987	32037	65024	10551	2045	12596	19.5	3.8	23.3

work cannot be done by an ad hoc staff recruited merely for this purpose because careful selection of personnel is essential and the staff has to be given proper training as otherwise the work would be too unreliable to be of any value. One way would be to have a sufficient number of additional hands provided in the area survey scheme who would be available for crop cutting work at the proper season. This, however, was not feasible within the sanctioned grant. The crop cutting work had to be done, therefore, by the area survey staff as best as they could manage it. As they had to move from one block to another they often found that a considerable proportion of the crop had already been harvested. This difficulty prevented our obtaining as many cuts as we had hoped but we did succeed in securing 2027 samples of Aus paddy and 1160 samples of Jute.

In table (1.4) cols.(3) and (4) give the zones and grids in which a second area enumeration was done along with crop-cutting work at harvest time. Cols.(5) and (6) show the number of zones and cells by districts in which Jute was harvested; cols.(7) and (8) show the number of sample-cuts by size. Similarly cols.(9) - (11) give the same information for Aus paddy.

Difficulties encountered in field survey: About 22,000 cadastral survey maps were found to be out of stock and only a portion could be replaced. In consequence some of the grids remained unsurveyed for want of maps.

A large proportion of the old trained staff did not rejoin. It was also found difficult to obtain new recruits of the required type in sufficient numbers. A large number of workers had to leave work due to attack of malaria and other diseases while working in the mofussil. An additional difficulty in such cases was that when workers fell ill they had to be discharged and substitutes appointed in their places in order that work could proceed according to the time programme. This had, to some extent, a demoralizing effect on the staff who as they ran the risk of being discharged even when they fell ill while performing their duty. Moreover, the field work involves a great deal of personal discomfort which was not considered as being compensated by the rates

Table (1-4)

Bengal Crop Survey Jute: Auo 1944-45
Statement showing by districts the number of
Grids and Sample cuts (Harvest Survey)

Districts	Period of Survey	Area Survey		Crop cutting									
		No of Zones	No of Grids	Jute				Auo					
				Zones	Cells	No of Sample		Zones	Cells	No of Sample			
(1)	(2)	(3)	(4)	(5)	(6)	5x5 $\frac{1}{2}$	10x10'	(7)	(8)	(9)	10'	11'	(12)
1 Ballerghang	24 July-13 Aug	11	287	3	11	44	10	4	14	100	6		
2 Bankura	13 Oct-25 Oct	9	233	-	-	-	-	8	22	146	22		
3 Birbhum	2 Nov-11 Nov	6	184	-	-	-	-	4	17	74	35		
4 Bogra	25 July-3 Aug	5	134	1	5	24	8	1	5	46	3		
5 Burdwan	4 Oct-30 Oct	7	208	-	-	-	-	8	27	136	19		
6 Chittorgong	12 Sept-16 Sept	3	96	-	-	-	-	2	3	16			
7 Laccia	6 July-9 Aug	12	254	8	32	204	28	8	32	164	28		
8 Lingspur	29 " - 16 Sept	15	444	6	19	54	3	9	24	100	19		
9 Faridpur	30 " - 16 Aug	7	188	6	21	96	17	7	22	130	15		
10 Hooghly	10 Sept-12 Oct	7	172	5	20	28	20	7	26	118	19		
11 Howrah													
12 Jalpaiguri	9 Aug-13 Sept	6	155	7	32	136	15	5	23	102	17		
13 Jeddore	10 " - 10 "	9	227	7	31	90	18	9	36	212	25		
14 Khatna	12 " - 9 "	10	283	4	13	34	5	5	14	84	10		
15 Maldah	13 " - 11 "	10	286	5	21	32	40	6	26	172	27		
16 Mirzapur	11 Sept-29 Oct	20	568	1	2	4		5	18	140	27		
17 Murshidabad	19 Aug-17 Sept	9	268	1	6	6	3	2	11	78	11		
18 Nyma singh	22 July-17 Aug	22	416	21	100	498	63	19	92	460	48		
19 Nadia	1 Aug-15 Sept	8	216	3	17	28	5	5	26	176	20		
20 Noakhali		1	30										
21 Pabna	27 July-15 Aug	7	207	2	5	16	6	3	8	54	3		
22 Rajshahi	5 Sept-7 Sept	9	264	1	6	8		1	6	32	4		
23 Rangpur	11 July-9 "	15	315	15	71	354	67	13	62	370	51		
24 Tipperah	24 " - 18 Aug	9	220	8	27	100	22	7	29	190	19		
25 Dh-Bangura	4 Sept-16 Sept	8	182	-	-	-	-	5	19	94	7		
All Districts	6 July-11 Nov	225	5917	104	439	1760	300	143	562	3194	430		

S. K. Ghosh
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of salary and allowances which were offered to the staff in the beginning. At a later stage, even at the risk of exceeding the budget, the Institute agreed to give somewhat better rates of pay. This was ultimately incorporated in the Budget which was submitted to the Government under the enlarged scheme. It was, however, found that even these rates of pay were not sufficiently attractive for the type of work that the staff had to do. The cumulative effect was that we were not been able to get, this year, a field staff of the required quality.

Another difficulty which confronted our workers was that they found it in most areas extremely difficult to obtain even temporary lodgings with local residents. In the years 1939 to 1942 most of the field workers had found the local people fairly hospitable, and had not only succeeded in getting lodgings comparatively easily but in many cases the people even gave them food during their temporary stay in villages. The famine of 1943 had changed all this and the people had become less hospitable of necessity. In many places no suitable accommodation could at all be had while in others such accommodation as were available were charged for at exorbitant rates.

Table (1.5) appended shows the position of staff by months. Col.(2) shows the numbers recruited per month, col.(3) gives the number who actually joined and col.(4) the number who deserted or were discharged. Col.(5) shows the net number who joined in different months; col.(6) the strength maintained at the end of each month, and col.(7) the percentage of number deserting. Table (1.6) shows the position regarding different types of workers.

Statistical analysis : As soon as the preparatory work was finished, area extraction i.e. (measurement of areas of plots to be surveyed) began. Photographic gratiules or scales were used for this purpose. The photographic scale was placed over the map and the area of that portion of each plot which was included within the grids was measured by counting the number of squares. The area of over 6,40,000 plots had to be measured in this way and the work was completed by the end of June, 1944.

Crop records as they were received were passed through various stages of tabulation and statistical checks; and the crop area from individual plots right up to the zone was calculated in a system of chain work. Tabulation

Bengal crop Survey: June-Aug 1944-45
 Table (15) Account of staff (Field Branch)
 Excluding establishment of Clerk and menials.

Month	Total appointed	Number			Strength at end of month	Percentage of position
		Actually joined	Discharged or Resigned	Net staff retained		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Recruitment and working strength by month</i>						
May	320	224	36	188	188	41.2
June	147	117	44	73	261	50.3
July	195	184	64	120	361	48.7
August	64	62	37	25	386	60.9
September	27	23	9	14	400	18.1
October	105	89	53	36	436	66.7
	861	699	263	436		49.4

Table (16) Recruitment and working strength by cadre.

Designation	Total appointed	Number			Percentage of position
		Actually joined	Discharged or Resigned	Net staff retained	
"	(2)	(3)	(4)	(5)	(6)
Chief Inspector	25	22	4	18	28.0
Inspector	109	94	30	64	41.3
Investigator etc.	727	583	229	354	57.3
	861	699	263	436	49.4

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was thus continuous and the acreages were daily accumulated so that on any particular day, the latest estimate could be reviewed and up-to-date progressive estimate could be submitted. This enabled up to date estimates being prepared and also supplied a good control over computation as well as the field survey. Any suspicious deviation from the general trend was noted so that enquiries could be made to detect the cause and take remedial measures.

Three progressive estimates for area under Jute and Aus were sent, the first on the ^{31st} 17th August 1944; the second on the 16th September 1944 and the third on the 14th October, 1944

Besides calculating crop acreages, a large volume of advanced statistical analysis was also done in connexion with the comparison of sub-samples, estimating the margin of error, application of appropriate statistical tests etc.

Section 3. Results of the Jute-Aus Survey, 1944-45.

This section gives results relating to Jute and Aus acreages, yield rates, and total outturn of dry fibre of jute and Aus rice (not in husk) in the case of Aus. Acreages obtained from the two sub-samples (A) and (B) are also compared with those obtained from grids checked during the area survey and also with acreages calculated from survey made at harvest time.

Area under Jute and Aus : Table (1.7) gives the area under jute in thousand acres with standard error by districts under sub-samples (A), (B) and combined in cols. (6) - (8); the number of grids, on which these estimates are based are shown in cols. (2) - (5). The total geographical area as recorded in the Census report of 1941 is shown in col. (2) in thousand acres. It may be noted that areas covered by forests and big rivers, bills etc. were excluded from the sample survey in the districts (1) Bakarganj, (2) Jalpaiguri, (3) Noakhali, and (4) Chittagong and (5) 24-Parganas while Darjeeling hills and Chittagong hills Tracts Dist. were left completely out of the survey. Special enquiries were, however, conducted in some of these areas and the results incorporated in the estimates which thus refer to the whole of British Bengal with the exception of Darjeeling Hills and Chittagong Hills in which amount of Jute or Aus grown is negligible.

Bengal Crop Survey: July Aug 1944-45
 Table (17) Comparison of the half sample estimates of area under jute during the pre-harvest survey.

Districts	Geographic Calcutta Thousand Acres (1941 Census)	Number of Grids			Average under jute in thousand acres			T	Percent variation ability
		A	B	Combined	A	B	Combined		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Bachergang	2421	1056	976	2032	12.3 ± 1.0	31.9 ± 5.6	37.5 ± 4.6	+1.17	12.27
Bahadur	1693	1260	1287	2547	3.0 ± 1.0	3.7 ± 1.7	3.4 ± 1.1	-	47
Birbhum	1116	775	786	1561	1.6 ± 0.7	0.6 ± 0.6	1.2 ± 0.5	+1.11	11.47
Bogra	944	776	702	1480	103.3 ± 7.8	63.6 ± 7.1	93.9 ± 5.3	+1.84	5.64
Burwan	1731	1387	1426	2815	5.0 ± 1.6	4.7 ± 1.4	4.8 ± 1.0	14	20.83
Clitangong	1644	301	290	591	1.0 ± 0.7	2.0 ± 0.6	1.5 ± 0.5	-1.11	33.33
Coimbatore	1752	1259	1256	2515	201.8 ± 10.2	266.6 ± 12.4	204.1 ± 7.9	-	30
Dainipuri	2530	2135	2075	4216	75.1 ± 6.8	78.1 ± 8.4	86.8 ± 5.3	-2.13	6.10
Faizpur	1505	1151	1170	2321	258.3 ± 13.5	199.8 ± 11.4	230.1 ± 4.5	+3.21	1.96
Hooghly	772	559	600	1159	29.4 ± 4.1	32.3 ± 4.5	30.9 ± 3.1	-	18
Howrah	359	305	190	495	3.4 ± 1.2	15.5 ± 5.6	8.0 ± 2.3	-2.12	28.75
Jalpaiguri	1952	719	753	1472	31.9 ± 4.4	16.2 ± 4.6	40.7 ± 3.3	-1.77	8.11
Jessore	1872	2395	2203	4598	57.2 ± 5.6	51.9 ± 5.6	84.6 ± 3.9	+1.67	4.61
Khulna	2075	1091	1133	2224	26.0 ± 4.7	29.0 ± 4.7	26.5 ± 3.3	-	15
Maldaha	1283	1055	1152	2207	32.6 ± 3.0	20.9 ± 4.6	21.8 ± 2.8	+1.35	12.84
Mirzapur	3375	2215	2149	4364	10.1 ± 2.0	5.4 ± 1.1	7.8 ± 1.1	+2.04	14.10
Murshidabad	1320	978	991	1969	39.1 ± 5.0	21.4 ± 3.7	30.2 ± 3.2	+2.85	10.62
Mynasigh	3940	2970	2511	5481	192.9 ± 16.6	162.6 ± 17.7	177.8 ± 12.6	+1.25	2.84
Nadia	1843	1483	1510	2993	51.9 ± 5.5	44.2 ± 4.8	48.8 ± 4.1	+1.76	8.40
Nawalpur	1061	479	146	925	17.7 ± 2.3	19.6 ± 2.5	16.6 ± 1.7	-	56
Patna	1175	881	901	1782	87.7 ± 7.5	63.5 ± 7.1	86.7 ± 5.2	+1.41	5.86
Rajshahi	1617	1236	1464	2700	65.9 ± 6.5	57.5 ± 7.1	78.1 ± 4.9	+1.94	6.27
Rangpur	2308	1702	1932	3634	308.3 ± 11.8	288.2 ± 10.6	297.9 ± 8.1	+1.26	2.72
Farpur	1620	1084	1007	2091	139.6 ± 10.2	145.1 ± 10.0	142.4 ± 7.1	-	38
Sh. Pargana	2365	1227	1222	2449	37.0 ± 4.6	39.4 ± 5.1	36.2 ± 3.4	-	35
All Districts	45573	30787	30037	60824	2150.3 ± 35.4	2058.1 ± 35.9	2106.3 ± 24.3	+1.87	1.15

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Results obtained from samples (A) & (B) fairly agree as will be seen from the 't' values shown in col.(9) which give the statistical measure of divergence in the scale of sampling error. Only 5 cases out of 25 is significant at 5 p.c. level. The standard errors of individual districts are also in satisfactory agreement between the two samples except in the case of Howrah where both acreage and standard error are found to differ.

The provincial acreage came out as 2150 for (A), 2056 for (B), and 2106 for the combined samples in thousand acres. Col.(10) gives the percentage variabilities (that is, the standard error of the mean expressed as a percentage of the mean of the district means which are usually about 10 p.c. or lower for the districts while the overall percentage variability is only 1.15 p.c.

Table (1.8) shows the estimated acreage under Aus paddy and in which the arrangements is exactly similar to table (7). Col.(6) gives the estimate for sample (A), col.(7) for sample (B), and col.(8) for the combined samples. The standard errors are also shown side by side. Col.(9) shows the value of Fisher's 't' for the divergence between (A) and (B). Only in 4 cases out of 25 the difference was significant (in districts Bakarganj, Birbhum, Hooghly and Tipperah). Col.(10) shows that the percentage variability of district figures lie between 2 and 14 with one exception. The provincial estimate has a variability of only 0.81 p.c.

Internal consistency of acreage estimate

Table (1.9) shows the area under Jute in thousand acres obtained from sub-samples (A) and (B), duplicated grids, checked grids, and the harvest time survey. Col. (7) gives the estimates based on all grids belonging to (A) and (B) samples ; col. (8) the estimate obtained from grids which were surveyed by both parties ; col. (9) the estimates based on the grids checked by inspectors and superior officers ; and col. (10) the estimate grids and shikar kanti etc. based

Bengal Crop Survey: Jute - Aus 1944-45

Table (18) Comparison of half sample estimates of area under Aus Paddy.

Districts	Geographical area in thousands of acres (1944-45)	Number of grids			Acreage under Aus in thousand acres			T.	Percentage variability
		A	B	Combined	A	B	Combined		
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(10)
Baergerganj	24 21	10 56	9 76	20 32	402 ± 24.9	339 ± 23.7	374 ± 17.5	2.58	4.68
Bankura	16 93	12 60	12 87	25 47	209 ± 17.6	178 ± 18.4	194 ± 12.7	1.22	6.55
Birbhum	11 16	7 75	7 86	15 61	41 ± 8.5	74 ± 13.8	56 ± 7.8	-2.04	13.93
Bogra	9 44	7 78	7 02	14 80	242 ± 14.4	248 ± 15.3	245 ± 10.5	- .29	4.29
Burdwan	17 31	13 87	14 28	28 15	60 ± 7.3	75 ± 9.9	67 ± 6.1	1.22	9.10
Chittagong	16 44	3 01	2 90	5 91	185 ± 14.1	177 ± 16.8	180 ± 10.9	.37	6.06
Dacca	17 52	12 59	12 56	25 15	339 ± 17.9	368 ± 19.4	353 ± 13.1	-1.10	3.71
Dinajpur	25 20	21 38	20 78	42 16	294 ± 17.5	330 ± 17.0	311 ± 12.1	-1.46	3.89
Faridpur	18 05	11 51	10 70	22 21	444 ± 16.6	429 ± 18.6	436 ± 12.5	.60	2.87
Hooghly	7 72	5 59	6 00	11 59	81 ± 12.7	51 ± 7.4	65 ± 7.2	2.04	11.03
Jessore	3 59	3 05	1 90	4 95	12 ± 3.8	16 ± 4.5	13 ± 2.9	- .68	2.23
Jalpaiguri	19 52	7 19	7 53	14 72	58 ± 7.2	62 ± 7.9	60 ± 5.4	- .37	9.00
Jessore	18 72	23 95	22 03	45 98	679 ± 17.2	654 ± 18.0	667 ± 12.4	1.00	1.86
Khulna	30 75	10 91	11 33	22 24	150 ± 13.6	147 ± 14.4	148 ± 9.9	.15	6.69
Maldah	12 83	10 55	11 52	22 07	286 ± 20.3	254 ± 17.4	269 ± 13.3	1.20	4.94
Midnapur	33 75	22 18	21 47	43 67	108 ± 14.5	115 ± 15.2	112 ± 10.5	- .33	9.38
Murshidabad	13 20	9 78	9 91	19 69	300 ± 23.5	314 ± 22.8	307 ± 6.4	- .43	5.34
Mymensingh	39 40	29 70	28 11	57 81	1059 ± 33.1	1076 ± 32.3	1067 ± 22.8	- .37	2.14
Nadia	18 43	14 83	15 10	29 93	660 ± 27.8	656 ± 24.7	658 ± 18.4	.11	2.80
Noakhali	10 61	4 79	4 46	9 25	280 ± 15.7	312 ± 14.8	295 ± 10.8	1.45	3.66
Pabna	11 75	8 81	9 01	17 82	243 ± 14.8	279 ± 15.4	261 ± 10.7	-1.68	4.10
Rajshahi	16 17	12 36	11 64	24 00	311 ± 21.5	325 ± 19.4	345 ± 14.4	1.42	4.17
Rangpur	23 08	17 02	19 32	36 34	781 ± 21.2	800 ± 20.3	790 ± 14.8	- .65	1.87
Tippurah	16 20	10 84	10 07	20 91	441 ± 23.6	566 ± 27.0	504 ± 18.1	-3.48	3.59
24 Paraganas	23 65	12 27	12 22	24 49	95 ± 10.0	97 ± 10.7	96 ± 7.4	- .14	7.71
All districts	4 55 73	304 87	300 37	605 24	7815 ± 90.3	7942 ± 90.4	78 73 ± 63.8	1.41	0.81

Bengal Crop Survey: Jute Area 1944-45
Table (1.9) Comparative figures for Jute area in thousand acres.

Districts	Geographical Area (in 1000) acres (1941 Census)	Number of Grids				Percentage under Jute in thousand acres based on			
		Preharvest Survey			Harvest Survey	Preharvest Survey			Harvest Survey
		All Grids	Duplicate Grids	Checked Grids		All Grids	Duplicate Grids	Checked Grids	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1 Backerganj	24.21	2032	656	750	267	37.5	22	16	182.8
2 Bankura	16.93	2547	576	545	233	3.4	4	3	0.0
3 Birbhum	11.16	1511	255	258	164	1.2	0	0	0.0
4 Bogra	9.44	1480	400	259	134	93.9	54	75	58.5
5 Burdwan	17.31	2515	416	430	218	4.8	4	10	1.8
6 Chittagong	16.44	591	192	113	96	1.5	2	0	1.6
7 Cocha	17.52	2515	460	341	254	204.1	189	172	191.0
8 Loxypur	25.30	4216	632	1095	444	86.8	95	58	57.0
9 Faridpur	18.65	2221	400	368	168	230.1	192	221	294.2
10 Hooghly	7.72	1159	245	254	172	30.9	42	36	21.7
11 Howrah	3.59	495	56	110	31	8.0	2	7	8.5
12 Jalpaiguri	19.52	1472	496	167	155	40.7	30	46	40.0
13 Jessore	18.72	4595	645	290	227	84.6	67	102	207.3
14 Khulna	30.75	2224	528	619	283	28.5	16	19	22.7
15 Malda	12.83	2207	456	556	286	21.8	34	21	37.2
16 Midnapur	33.75	4367	1320	1042	568	7.8	5	4	0.0
17 Murshidabad	13.20	1747	496	965	265	30.2	35	34	55.4
18 Nymansingh	39.46	5751	965	915	466	477.8	571	494	466.0
19 Nadia	15.43	2993	564	524	216	48.8	39	46	86.7
20 Noakhali	10.11	925	258	369	30	18.6	17	17	0.3
21 Pabna	11.75	1752	440	231	207	88.7	70	96	57.6
22 Rajshahi	16.17	2400	486	653	264	78.1	120	88	57.0
23 Rangpur	23.05	3634	760	860	348	297.9	250	287	325.9
24 Tipperah	16.20	2091	472	302	220	142.4	162	133	156.6
25 Dhaka	23.65	2740	648	562	182	38.2	34	28	25.3
All Districts	45573	60524	13116	12646	5779	2106.3	2086	2013	2262.4

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Taken from preharvest survey

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on the grids surveyed at harvest time. The provincial estimates are (in thousand acres) 2106 and 2086 for ^{all grids and grids duplicated} the sub-samples (A) and (B) respectively, and 2013 for ^{checked} duplicated grids showing satisfactory agreement. The harvest survey gives a higher figures (~~2253.6~~) which is almost certainly due to a large sampling fluctuation which is only natural as the estimate is based on less than 6000 grids for the province as a whole.

Table (1.10) which is similar to table (1.9) shows the estimates of area under Aus paddy based on all grids in col.(7), on duplicated grids in col.(8), on checked grids in col.(9) and harvest time surveyed grids in col.(10) respectively. The provincial estimates are 7873, 7850, 7789 and 7412 thousand acres.

Notes of yield of Jute and Aus : Table (1.3) given in the previous section shows that the full extent and volume of crop cutting work could not be carried out according to schedule. The number of sample cuts was in fact not sufficient in most of the districts. Cols.(5) and (7) in table (1.11) gives the estimated yield rate converted from the weight of green plants in maunds of dry fibre per acre by district estimated separately from cuts of size 5.2 x 5.2 and 10 x 10 sq. ft.

It may be noticed that yield is consistently lower in the case of cuts of bigger size. In the crop cutting work on Jute conducted during the period 1937-1940, it had been found that there was a definite bias towards over estimation in the case of cuts of smaller sizes (when the sample-cuts were demarcated by ropes and pegs), and that such bias decreased with increasing size of the sample-cut and practically vanished beyond about 50 sq. ft. The investigator probably has a tendency to include more of the bordering plants inside the cut than is proper. The bigger the size the less is the proportion of perimeter to the area of the cut, and the less pronounced would be such bias. In view of the previous work on jute, estimates based on cuts of size 10' x 10' have been adopted for final calculations.

The district yield rate in maunds of dry fibre is found to vary from 8.9 to 22.5 while the weighted mean yield rate for the province comes out to be 15.4 for the bigger cuts.

Bengal crop Survey: July. Aug 1944-45

Table (110) Comparative figures for Aus area in thousand acres

Districts	Geographical area in thousand acres (1941 census)	Number of Grids				Average under Aus in thousand acres based on			
		Pre-harvest Survey			Harvest	Pre-harvest Survey			Harvest
		All Grids	Copied Grids	Checked Grids	Survey	All Grids	Copied Grids	Checked Grids	Survey
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Baekergang	2421	2032	656	780	287	374	376	355	344
Baekura	1693	2517	576	545	233	194	146	204	217
Birbhum	1116	1511	258	258	164	56	95	38	77
Bogra	944	1480	400	288	134	245	172	217	188
Burduwan	1731	2815	416	430	205	67	59	66	81
Chittagang	1644	591	192	113	96	180	179	224	127
Dacca	1752	2515	480	311	254	353	324	383	338
Lingapur	2530	1216	832	1098	444	311	263	316	301
Faraapur	1805	2221	400	368	188	436	472	350	348
Hooagly	772	1159	248	254	172	65	74	58	115
Howrah	359	495	56	110	38	13	3	19	13
Jalpaiguri	1952	1472	496	167	155	60	40	70	83
Jessore	1872	1598	648	290	227	667	664	701	577
Khulna	3075	2224	528	619	283	148	97	84	96
Maldah	1283	2207	488	556	286	219	251	238	319
Midnapur	3375	4367	1320	1042	568	112	181	175	147
Murshidabad	1320	1969	196	768	265	307	253	347	403
Myra Singh	3940	5781	968	918	466	1067	1245	963	1107
Nadia	1813	2992	564	524	216	658	629	677	698
Noakhali	1011	925	256	369	30	295	322	272	177
Pabna	1175	1782	440	231	207	261	265	265	191
Rangshahi	1617	2400	488	632	264	345	308	312	271
Rangpur	2308	3634	760	860	348	790	797	847	683
Tippurah	1620	2091	472	302	220	504	550	576	400
24 - Rangpur	2365	2777	618	562	182	196	91	62	63
All Districts	45573	60524	13116	12646	5948	7873	7856	7789	7472
					5917				7369

Taken from pre-harvest survey.

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Bengal Crop Survey: July. Aug. 1944-45
Table (1-11) Yield rate of jute and Aus by districts.

Districts	Jute						Aus					
	Crop area in Hectares Sample 1944	No of Zones	Size. 5.2x5.2 2		Size. 10x10'		Crop area in Hectares Sample 1944	No of Zones	Size 5.2x5.2' 2		Size 10x10'	
			No	Yield in Mds per acre dry 7 lbs	No	Yield in Mds per acre dry 7 lbs			No	Yield in Mds per acre dry in 1000	No	Yield in Mds per acre dry in 1000
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1 Backergang	37	3	44	13.3	10	14.9	374	4	100	18.4	6	14.4
2 Barpura							194	8	146	7.2	22	6.8
3 Birbhum							56	4	74	14.2	35	12.6
4 Bogra	94	1	29	17.8	5	8.9	246	1	46	17.3	3	14.8
5 Burdwan							67	8	136	12.0	19	7.7
6 Chittagong							160	2	16	17.4	-	9.4
7 Dacca	204	8	204	18.0	28	17.4	353	8	164	8.7	28	6.8
8 Durgajpur	87	6	54	19.8	3	14.7	311	9	100	9.5	19	10.2
9 Faridpur	230	6	96	17.0	17	22.0	436	7	130	13.5	15	12.1
10 Hooghly	31	5	28	25.4	20	16.0	65	7	118	11.8	19	12.6
11 Jalpaiguri	41	7	138	20.0	15	16.6	60	5	102	9.6	17	8.0
12 Jessore	85	7	90	18.0	18	15.4	667	9	212	15.9	25	12.8
13 Khulna	28	4	34	16.8	5	22.5	146	5	84	14.8	10	15.8
14 Maldah	22	5	32	23.7	10	15.8	269	6	172	10.3	27	7.8
15 Midnapur	8	1	4	9.6	-	15.4	112	5	140	7.3	22	4.9
16 Murshidabad	30	1	6	18.6	3	11.3	307	2	78	18.3	11	17.3
17 Nymensingh	478	21	498	19.3	63	14.0	1067	19	160	8.1	48	7.1
18 Nadia	49	3	28	16.3	5	9.9	658	5	176	11.6	20	8.4
19 Pabna	89	2	16	14.5	6	13.6	261	3	54	6.0	3	8.8
20 Rajshahi	78	1	8	13.0	-	15.4	345	1	32	9.2	4	6.7
21 Rangpur	298	15	356	24.6	67	15.5	790	13	370	8.9	51	6.3
22 Tippera	142	8	100	20.1	22	13.6	504	7	190	9.7	19	6.4
23 24 Parganas						-	96	5	94	12.9	7	10.2
Other districts	76			19.0	-	15.4	308	-		11.45	-	9.4
All districts	2107	104	1760	19.0	300	15.4	7873	143	3194	11.45	430	9.4

Similar figures for Aus paddy are shown in the same table. The mean yield in terms of clean rice (not in husk) based on 5.2 x 5.2 sq. ft. cuts as shown in col.(11) is higher than the mean rates shown in col.(12) based on the bigger size 10' x 10' sq. ft. The district yield rate is found to vary from 6.3 to 17.5 maunds for cuts of the bigger size, and the weighted mean yield rate for the province comes out as 9.4 maunds per acre.

Provincial acreage and outturn of Jute and Aus paddy. The results of provincial acreages for jute and Aus paddy are shown below in table (1.12).

Table 1.12. Provincial acreage under jute and aus.

Crop	Acreage with S.E.		Difference A-B		Combined (A+B)±S.E.	P.C. variability
	A	B	P.C. to combined	t		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Jute	2150 ± 35	2056 ± 36	4.46	1.87	2106 ± 24	1.14
Aus	7815 ± 90	7942 ± 90	1.61	1.41	7873 ± 64	0.61

It will be seen that the difference between the sample estimates as percentage to the combined as given in col.(4) is 4.46 p.c. for Jute and 1.61 p.c. for Aus. The same measured in the scale of 't' values is given in col.(5); 't'-values are not significant in either case. The provincial acreage estimate has a percentage variability of 1.14 for Jute and 0.61 for Aus paddy as given in col.(7).

Mean yield rates and total outturn in lakhs of maunds of dry fibre in the case of Jute, and rice (not in husk) in the case of Aus paddy are shown in table (1.13),

Table 1.13. Provincial yield rate of jute and aus.

Crop	Acreage	Yield in mds. per acre ± S.E.	Percentage variability	Outturn in lakhs of mds.
(1)	(2)	(3)	(4)	(5)
Jute (dry.fibre)	2106	15.4 ± 0.62	4.01	324
Aus (not in husk)	7873	9.4 ± 0.39	4.14	740

Yield rates are given with their standard errors as calculated by the multi-stage methods. Percentage variability is given in col.(4) as 4.01 p.c. for Jute and 4.14 p.c. for Aus, while total outturn comes out to be lakhs of maunds of dry fibre of Jute equivalent to 67 lakhs of bales (of 400 lb.) and 740 lakhs of maunds of rice (not in husk).

Section 4. The design of the survey in the Aman Season 1944-45.

Design of the survey: The design of the survey in the Aman season was the same in structure as that used in the Jute-Aus season. But with a view to giving effect to the enlarged scheme already referred to, the number of sample-units was increased by about 50 per cent.

Stratification of zones: As in the Jute-Aus season, the entire province was divided into square zones each of 64 square miles in area, and the zones falling in the hills and reserved forests were left out of the survey.

Sample selection: In the first stage, each zone was divided into 64 square cells each of area one square mile, and 26 cells were chosen from each zone, at random. (It would be remembered that only 14 cells from each zone had been used in the Jute-Aus survey. In the second stage 4 sample-units (or grids) each of area 2.25 acres were located at random within each cell so that the average density of grids was more than 1.6 per square mile whereas the density was less than 1 per sq. mile in the Jute-Aus survey.)

Interpenetrating sub-samples: The twenty-six cells selected from each zone were grouped in two sub-samples (A) and (B) each retaining its random character. These sub-samples were both scattered over the zone, and the field work in the two sub-samples was done by two parties entirely independent of one another so that two entirely independent estimates of crop acreage were obtained.

Duplicate grids: About 10 per cent of the grids were included in both the sub-samples. These grids were surveyed twice by the two independent parties, first with the sub-sample (A) and secondly with the sub-sample (B). This provided a good check on the reliability of primary work.

Collection of information: The investigators went to each plot in the selected grids, and recorded, in the appropriate columns of the form supplied, the proportion of land in each plot under different crops in terms of tannas. Besides Aman paddy, other crops of the season covered in this way were sugarcane, potato, etc. The investigators also recorded the proportion of land lying fallow classified as follows:-

- (1) Current fallow (land cultivated either in the previous season or year but not in this season.)
- (2) New fallow (no crop grown during the last three years but used to be cultivated before).
- (3) Old fallow (cultivable land not falling in (1) or (2).
- (4) Uncultivable waste land.

Selection of samples for crop-cutting: The zones were grouped into 240 sub-blocks each consisting of 4 zones, and one zone was selected at random from each sub-block. Each selected zone was then sub-divided into 64 square cells each of 1 square mile in area, and 8 cells were chosen at random from each zone. Next, four grids each of area 2.25 acres were chosen at random from each cell. Out of those 32 grids selected from each zone, crop-cutting was to be done in at least 16 grids, choice being restricted by the availability of the crop. No less than 25 plots were to be taken from these 16 grids for crop-cutting not more than 2 plots and not less than one plot being taken from any one grid.

Size of cuts: In every plot selected for crop-cutting, two triangular cuts were taken each of size $(5.2 \times 5.2)/2$ sq. ft. forming a square of size $5'.2 \times 5'.2$. In each alternate plot, over and above this doublet, another cut of size 10×10 sq. ft. was taken.

Location of cuts: The position of cuts in the plot was fixed as in the Jute-Aus season, by means of random numbers. The workers were supplied with tables of random numbers out of which two numbers were picked up in serial order for each selected plot. The first random number gave the number of steps the workers was to measure along the length of the plot from one corner and the second random number gave the number of steps which he was required to walk into the plot perpendicular to the length of the plot and parallel to the other sides. The point located in this way formed one of the corners of the square.

Field records: The workers were required to record the weight of paddy immediately after harvesting and threshing (called weight of "green paddy, or still more briefly "green weight" of crop) in talas for each cut. The corresponding weights were also recorded after drying the paddy for about a fortnight.

(These are called "dry weight" of paddy). Other additional information such as name of seeds, name and quantity of manure used, the nature of ownership of the land, whether the crop was sown or transplanted, the proportion of crop damaged etc was also collected.

Harvest survey: The investigators were required to do an area enumeration of different crops in the grids selected for crop-cutting work which supplied an estimate of the area actually harvested.

Field organization: As in the Jute-Aus season, the zones were grouped into 60 blocks each consisting of 16 to 18 zones. A camp office was established in each block in charge of a camp clerk. Each block again, was divided into 4 sub-blocks consisting of 3 to 5 zones. Party of 4 investigators working under an inspector was placed in a block, each investigator being posted in any one of the 4 sub-blocks. After a party surveying sub-sample (A) or (B) had completed a particular block, another party surveying the other sub-sample was placed in the block. The time lag between the two parties on an average was about a fortnight. The blocks were regrouped into 16 charges, each charge being under the supervision of a chief inspector. These 16 charges were again grouped into four ranges, each range being under the charge of an assistant or deputy supervisor. At the head of the field organization was the Superintendent who supervised the whole survey. A number of additional inspectors and investigators were also maintained to fill up leave vacancies and help in specially difficult areas or areas where work lagged behind for any reasons.

Each investigator was supplied with the field lists of grids allotted to him together with G.S. maps of the villages in which these grids had fallen. The inspector in charge distributed the work among his investigators. The investigator was to go to the field with the appropriate village maps, identify the plots (of which the revenue serial numbers were noted in the field lists) and make an actual physical examination of the crops growing on each of these plots. He was then to enter estimates of the proportion of land under different crops in the appropriate columns in the field forms. The inspector in charge of each party kept in touch with the investigators and inspected 15 to 20 % of their work by moving from one sub-block to another. He was responsible for the accuracy of the work done by his unit. The Chief Inspectors and Range Officers also moved constantly from unit to unit inspecting and supervising the actual survey work and organizational aspects thereof.

General account of the Aman Survey : 1944-45.

Preparatory work: The preparatory work started towards the end of May and was completed by the middle of August. In this season 105,200 grids (a number about 50 per cent higher than that used in Jute-Aus survey) were located on maps at random. These grids were listed in two independent sub-samples to be surveyed by two independent field parties. Lists of grids for area survey were ready for despatch to field branch by the middle of August. The preparation of field lists for crop-cutting went on along with tabulation for Jute-Aus records and was completed by the end of September.

Field work: In East and North Bengal blocks in which the Jute-Aus survey work had been completed by the end of August, the area survey started by the first week of September except in areas which were flooded during the rains. In other blocks, the survey work started at the beginning of October and in a few low lying blocks, in November. The area survey was completed by the middle of January 1945.

Table (2.1) shows by districts the number of sample-units in the different stages that were surveyed under sub-samples (A) and (B). Col.(2) gives the period of survey, cols.(3) - (5) give the number of zones, (6) - (8) the number of cells and (9) - (11) the number of grids surveyed by sub-samples.

Table (2.2) gives the number of grids surveyed and resurveyed, and Table (2.3) shows the number of grids checked by inspectors and superior officers. The overall percentage of grids checked was 17.5 per cent which is quite satisfactory.

As in the case of area survey, the crop-cutting of Aman paddy was made at different times in different parts of the province. Crop-cutting work commenced in the early harvest ^{The first week of November,} 1944 and continued till ^{The end of December, 1944} January 1945.

Table (2.4) shows by districts the number of sample units from which crop-cutting was made. In all 10,964 cuts of size 5.2×5.2 sq. ft. and 2,722 cuts of size 10×10 sq. ft. were taken from 5,432 plots in 3,431 grids in 223 zones. Along with crop-cutting, area enumeration of 223 zones was repeated in part so as to obtain an acreage estimate for crops standing at harvest time.

Bengal crop Survey; Aman 1944-45
 Preharvest Survey: Statement showing no. of zones,
 cells and Grids Surveyed, with Period of Survey.

Districts	Period of Survey	No of Zones			No of cells			No of Grids		
		A	B	combined	A	B	combined	A	B	combined
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1 Backergonj	5/9 - 29/12	43	44	87	269	261	530	24 14	24 13	4827
2 Bankura	2/9 - 12/12	36	37	75	230	239	469	21 04	20 47	4151
3 Birbhum	26/9 - 11/11	26	26	52	262	254	516	15 07	15 07	3008
4 Bonga	29/9 - 13/12	22	22	44	219	209	428	12 40	12 68	2508
5 Burdwan	6/9 - 23/12	42	42	84	425	424	849	23 11	22 68	4579
6 Chittagong	8/11 - 12/11	8	10	18	67	71	138	625	623	1248
7 Dacca	1/11 - 15/11	44	42	86	376	385	761	22 00	21 38	4338
8 Dinajpur	4/10 - 22/12	60	60	120	646	618	1264	33 76	32 79	6655
9 Faridpur	7/11 - 14/11	36	37	73	312	311	623	18 43	18 42	3685
10 Hooghly	11/12 - 24/12	20	20	40	191	187	378	10 39	9 78	2017
11 Howrah	24/10 - 13/11	7	7	14	70	58	128	4 36	4 37	875
12 Jalpaiguri	16/9 - 19/11	23	22	45	168	163	331	13 31	13 54	2685
13 Jessore	11/10 - 9/12	43	42	85	457	432	889	24 37	23 07	4738
14 Khulna	8/9 - 25/12	33	31	64	358	303	661	18 63	18 13	3676
15 Malda	17/9 - 8/12	28	29	57	294	290	584	17 34	17 03	3437
16 Midnapur	3/9 - 11/12	40	40	80	391	391	782	39 14	39 39	7853
17 Murshidabad	9/9 - 12/12	32	31	63	308	330	636	16 13	17 49	3362
18 Nymensingh	4/9 - 6/12	90	90	180	894	881	1775	48 21	47 86	9607
19 Nadia	6/9 - 16/11	42	42	84	421	401	822	22 98	22 10	4508
20 Noakhali	10/10 - 19/12	16	16	32	133	126	259	8 83	8 55	1736
21 Patna	10/9 - 5/12	26	26	52	275	256	531	15 24	14 44	2968
22 Rayshahi	3/9 - 12/12	35	35	70	355	334	689	19 71	18 86	3857
23 Rangpur	7/10 - 29/12	54	53	107	569	540	1109	30 85	30 36	6121
24 Tipperah	5/9 - 8/12	34	32	66	311	307	618	19 62	19 41	3903
25 24-Pargana	28/10 - 14/12	32	34	66	307	311	618	19 66	22 96	4264
All districts	2/9 - 15/11	874	870	1744	8308	8082	16390	505 01	501 07	10 66 08

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Table (2.2) Statement showing the number of Sample units Surveyed and resurveyed

Range	Number of Grids						Resurveyed
	In the Programme			Surveyed			
	Half Sample "A"	Half Sample "B"	Combined	Half Sample "A"	Half Sample "B"	Combined	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
North Bengal	14310	14368	28668	13018	12863	25881	2856
East Bengal	14580	14590	29170	10562	10413	20975	1772
South Bengal	10086	10086	20172	9260	9313	18573	1720
West Bengal	13600	13620	27220	9929	9786	19715	1384
Total	52536	52664	105200	42769	42375	85144	7732

Table (2.3) Statement showing the number of grids checked by officers of different Cadre

Range	Total number of Grids			Numbers of Grids checked			Percentage of Grids checked		
	Surveyed & resurveyed			Inspector	Chief Inspector	Total	Inspector	Chief Inspector	Total
	A	B	A+B	(5)	(6)	(7)	(8)	(9)	(10)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
North Bengal	15674	15719	31593	5308	885	6193	16.8	2.8	19.6
East Bengal	12334	12185	24519	3335	662	3997	13.6	2.7	16.3
South Bengal	10980	11033	22013	3366	374	3742	15.3	1.7	16.9
West Bengal	11313	11170	22483	2238	427	2665	14.4	1.9	16.3
Total	50501	50107	100608	15219	2348	17567	15.2	2.3	17.5

Bhatnagar

Bengal Crop Survey 1944-45
 Harvest Survey: Statement Showing the No of
 Grids and Sample cuts by districts.

Districts	Period of Survey	Area Survey		Crop Cutting				
		No. of		No. of			No. of Sample	
		Zones	Grids	Zones	Grids	Plots	55x55 ft.	10'x10'
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1 Bakergang	4/12 - 29/12	14	283	14	283	572	1024	250
2 Baidyara	15/11 - 26/12	13	148	13	148	220	440	105
3 Birbhum	25/11 - 14/12	5	61	5	61	79	158	40
4 Bogra	3/12 - 15/12	6	113	6	113	161	320	79
5 Burdwan	22/11 - 24/12	9	138	9	138	275	550	145
6 Chittagong	26/11 - 17/12	2	29	2	29	72	144	34
7 Dacca	15/11 - 4/12	11	199	11	199	309	618	152
8 Dinajpur	22/11 - 25/12	16	246	16	246	484	968	235
9 Faridpur	18/11 - 14/12	7	85	7	85	153	308	71
10 Hooghly	1/12 - 13/12	4	55	4	55	100	200	74
11 Howrah	26/12 - 19/12	3	49	3	49	97	194	50
12 Jalpaiguri	7/12 - 20/12	7	109	7	109	58	116	30
13 Jessore	14/11 - 23/12	11	137	11	137	299	598	188
14 Khulna	9/11 - 31/12	7	120	7	120	186	372	91
15 Maldah	20/11 - 15/12	6	95	6	95	167	334	81
16 Midnapur	2/11 - 6/12	16	258	16	258	449	898	224
17 Murshidabad	19/11 - 10/12	5	67	5	67	137	274	70
18 Nymansingh	15/11 - 21/12	25	432	25	432	564	1128	290
19 Nadia	16/11 - 15/12	11	117	11	117	200	400	69
20 Noakhal	18/11 - 15/12	5	83	5	83	133	266	42
21 Patna	19/11 - 25/12	4	54	4	54	73	146	35
22 Rayshahi	27/11 - 20/12	7	107	7	107	201	402	99
23 Roaypur	23/11 - 17/12	13	203	13	203	141	282	70
24 Tipperah	11/11 - 10/12	8	135	8	135	193	386	91
25 24 Pargana	22/11 - 24/11	8	158	8	158	219	438	107
All Districts	2/11 - 31/12	223	3481	223	3481	5482	10964	2722

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Difficulties of field work: As in Jute-Aus season, the temporary nature of the appointments and the tiresome duties made it extremely difficult to retain the staff as men of average ability could easily get better salaries elsewhere with less arduous work. The position can be appreciated from the figures given in Table (2.5). Col.(1) shows the type of staff; col.(2) the number of persons who remained after the Jute-Aus survey, i.e. at the beginning of the Agan survey; col.(3) the number who completed their training and were given appointments; col.(4) the number who resigned or were discharged; col.(5) the number at the end of Agan season; and col.(6) the percentage of desertion.

Table (2.6) shows the distribution of staff according to length of experience. Col.(1) gives the type of staff; col.(2) the number of workers who were recruited for the first time in 1944 Agan season and therefore did not have any previous experience, and col.(3) the number who had some experience in the Jute-Aus season. Successive cols.(4) - (13) show the number of workers with experience of one year, two years, etc. up to 7 years' experience of crop survey work. Looking at the bottom line we notice that out of a total staff of 602 who had actually participated in the survey no less than 220 (about 37 per cent) had no previous experience, 197 had part experience in one season; 77 had experience of work in one season; 54 had work in two seasons, and only 54 (less than 9 per cent) of the total staff had more than two years' experience.

It is scarcely necessary to emphasize the difficulties in carrying out work of this kind with a staff the bulk of which is recruited for a short period from year to year. A large proportion of workers suffered from malaria, and a good number had to go on leave or resigned on account of serious or continued illness. Recruitment had, therefore, to be made during November both in the ranks of investigators and inspectors. Difficulties in obtaining quinine locally in rural areas hampered the work to a great extent.

Another serious difficulty which the field staff had to face was about the supply of cloth and controlled or rationed goods. As they were mobile workers moving continuously from one place to another no local panchayat food committee would give them ration cards for supply of such articles. The local supply officers were sympathetic in some places, but some did not help them in this matter.

Table (2.5) Bengal Crop Survey: Aman, 1944-45
Recruitment and working strength by cadre

Type of staff	Number				Percentage of duration
	At the end of Sub-Aman season	Appointed	discharge of field staff at the end of Aman season	At the end of Aman season	
(i)	(ii)	(iii)	(iv)	(v)	(vi)
Chief Inspector	18	2	3	17	15.0
Inspector	62	23	14	71	16.5
Investigator	237	178	156	259	37.6
Camp clerk	65	17	13	69	15.8
Total	382	220	186	416	309

Table (2.6) Distribution of field staff by years of experience

Type of staff	Experience in Years										Total
	0	1	2	3	4	5	6	7	8	9	
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)	(xi)	
Chief Inspector	2	6	3	2	2	4	-	-	1	20	
Inspector	23	29	6	13	7	3	1	2	1	85	
Investigator	178	112	62	36	19	7	1	-	-	415	
Camp Clerk	17	50	6	3	5	1	-	-	-	82	
Total	220	197	77	54	33	15	2	-2	2	602	

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Area extraction: Preparatory work for Aman survey was completed by the end of September while the Jute-Ams tabulation was going on. After finishing the preparation of field list, the statistical section took up the work of area extraction i.e. measurement of the areas of plots falling within the grids. This had to be done for about 40,000 ^{new} grids covering about 4,60,000 plots. The area was measured by placing photographic scales over the map and counting the number mm of small squares covering the plot.

Tabulation of crop records : The field records began to reach the Statistical Laboratory from the 1st week of October. The records as soon as received, were passed through various stages of tabulation. As in the Jute-Ams season, tabulation was continuous and progressive totals were maintained. Seven progressive estimates of acreage under Aman paddy were submitted between 19 December 1944 and 22 February 1945. Hollerith equipment was used for a great deal of the statistical work.

Section 6. Results of Aman Survey 1944-45.

Area under Aman paddy 1944 : The estimated acreage under Aman in 1944 is shown in Table (2.7) in which cols.(5) - (5) show the number of sample units on which the acreage estimates are based. The estimates based on sub-samples ~~xxxx~~ (A) and (B) with their standard errors are shown in cols.(6) and (7), while the acreage estimates based on the whole material are shown in col.(8) with the appropriate standard error. The provincial acreage based on the combined sample is 22,201 thousand acres, with a standard error of 216 thousand acres. In col.(8) is shown the percentage variability of the estimate which varies from 3.38 to 16.04 for districts while the percentage variability for the provincial estimate is only 1.24.

Comparison of Half-sample estimates : The estimates obtained from half samples (A) & (B) are compared in Table (2.8) with the help of Fisher's t-statistic which is simply the difference of the two estimates under comparison divided by the standard error of the difference. The values of 't' are shown in col.(9). The differences may be considered statistically insignificant unless the corresponding numerical values of t exceed 2. It will be noticed that in the present case all the values of 't' are less than 1 excepting for the ^{district of Palna} provincial acreage for which it is 1.75. The agreement between the half-sample estimates is thus quite satisfactory.

Table (27)

Bengal Crop Survey: Aman 1944-45
Statement showing areas under Aman Paddy by districts
and half-Samples.

Districts	Geographical area in (000) acres	No of Fields Surveyed			Area under Aman in (000) acres \pm S.E.			Ry.
		Half Sample		Combined	Half-Sample		Combined	
		A	B		A	B		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1 Bakerganj	2421	2414	2413	4827	1537 \pm 197.32	1495 \pm 91.27	1516 \pm 66.58	4.39
2 Banerua	1693	2104	2047	4151	709 \pm 179.23	715 \pm 72.46	712 \pm 53.67	7.54
3 Birbhum	1116	1507	1507	3008	735 \pm 57.00	693 \pm 59.48	714 \pm 39.17	5.49
4 Bogra	944	1240	1268	2508	577 \pm 145.78	562 \pm 147.20	570 \pm 33.04	5.80
5 Burdwan	1731	2311	2268	4579	1049 \pm 179.60	1071 \pm 71.49	1060 \pm 53.66	5.06
6 Chittagong	1644	625	623	1248	507 \pm 109.37	475 \pm 113.97	492 \pm 78.90	16.04
7 Dacca	1752	2200	2138	4338	955 \pm 133.18	889 \pm 69.25	922 \pm 59.13	6.41
8 Dinajpur	2530	3376	3279	6655	1475 \pm 78.43	1424 \pm 81.72	1450 \pm 57.67	3.98
9 Faridpur	1805	1843	1842	3685	1007 \pm 63.55	972 \pm 62.20	989 \pm 46.29	4.68
10 Hooghly	772	1039	978	2017	466 \pm 145.16	481 \pm 53.04	474 \pm 34.82	7.35
11 Howrah	359	438	437	875	222 \pm 140.32	232 \pm 142.74	227 \pm 29.58	13.03
12 Jalpaiguri	1952	1331	1354	2685	595 \pm 283.37	516 \pm 74.64	555 \pm 147.96	8.64
13 Jessore	1872	2437	2307	4738	732 \pm 70.76	778 \pm 70.57	755 \pm 49.18	6.51
14 Khulna	3075	1863	1813	3676	1014 \pm 170.57	960 \pm 66.02	987 \pm 49.06	4.97
15 Malda	1283	1734	1703	3437	421 \pm 158.36	490 \pm 59.40	4156 \pm 141.57	9.12
16 Midnapur	3375	3914	3939	7853	1940 \pm 197.20	1932 \pm 128.25	1946 \pm 80.32	4.13
17 Murshidabad	1320	1613	1749	3362	535 \pm 169.2	468 \pm 52.27	502 \pm 42.50	8.47
18 Nymensingh	3940	4821	4786	9607	1972 \pm 93.46	1991 \pm 96.57	1982 \pm 16.96	3.36
19 Nadia	1843	2298	2210	4508	527 \pm 117.40	467 \pm 14.32	497 \pm 66.90	13.46
20 Noakhali	1061	883	855	1736	609 \pm 66.22	595 \pm 73.95	602 \pm 50.29	8.35
21 Patna	1175	1524	1444	2966	571 \pm 158.04	426 \pm 59.46	498 \pm 41.60	8.35
22 Rajshahi	1617	1971	1886	3857	945 \pm 66.30	876 \pm 60.84	911 \pm 44.95	4.93
23 Rangpur	2388	3085	3036	6121	1042 \pm 81.07	1052 \pm 75.47	1047 \pm 55.39	5.29
24 Tipperah	1620	1962	1941	3903	1085 \pm 79.06	1105 \pm 69.82	1095 \pm 53.46	4.88
25 Dh-Durgans	2866	1968	2296	4264	1266 \pm 190.56	1218 \pm 105.15	1242 \pm 69.53	5.60
All Districts	46878	50507	50107	100608	24494 \pm 1407.73	21903 \pm 378.27	22207 \pm 276.58	1.27

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Bengal crop survey : Aman 1944-45
 Table (28) Comparison of half sample estimates of Aman acreage by district

District	Geographical area in square miles	Half-Sample A		Half-Sample B		Diff A-B	t
		No of Grids Surveyed	Area under Aman in (000) acres \pm S.E.	No of Grids Surveyed	Area under Aman in (000) acres \pm S.E.		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1 Bakarganj	24.21	24.14	1527 \pm 97.32	24.13	1495 \pm 91.27	42	0.32
2 Bankura	16.93	21.04	709 \pm 79.23	20.47	715 \pm 72.46	6	0.06
3 Birbhum	11.16	15.07	735 \pm 51.00	15.01	693 \pm 57.48	42	0.54
4 Bogra	9.44	12.40	577 \pm 45.78	12.68	562 \pm 47.20	15	0.23
5 Burdwan	17.31	23.11	1049 \pm 79.80	22.66	1071 \pm 71.49	22	0.20
6o Chittagong	16.44	6.25	509 \pm 109.37	6.23	475 \pm 113.77	34	0.22
7 Cooca	17.52	22.00	955 \pm 133.16	21.38	889 \pm 69.25	66	0.56
8 Lixajpur	25.30	33.76	1475 \pm 78.43	32.79	1424 \pm 81.72	51	0.44
9 Faridpur	16.05	18.43	1007 \pm 63.55	18.42	972 \pm 62.20	35	0.38
10 Hooghly	7.72	10.39	466 \pm 45.16	9.78	481 \pm 53.04	-15	0.22
11 Howrah	3.59	4.36	222 \pm 40.32	4.37	232 \pm 42.74	-10	0.17
12 Jalpaiguri	19.52	13.31	577 \pm 83.37	13.54	516 \pm 74.64	78	0.81
13 Jessore	18.72	24.37	732 \pm 70.76	23.07	776 \pm 70.57	-46	0.47
14 Khulna	30.75	16.63	1014 \pm 70.57	16.13	960 \pm 66.02	54	0.55
15 Malda	16.83	17.34	421 \pm 56.36	17.03	490 \pm 59.40	-69	0.83
16 Midnapur	33.75	39.14	1940 \pm 97.20	39.39	1952 \pm 128.25	-12	0.07
17 Murshidabad	13.20	16.13	535 \pm 66.92	17.49	468 \pm 42.27	67	0.79
18 Nymourigh	35.40	46.21	1972 \pm 93.46	47.66	1991 \pm 96.57	-19	0.14
19 Nadia	16.43	22.98	527 \pm 117.40	22.10	467 \pm 64.32	60	0.45
20 Nua Khab	10.61	8.83	609 \pm 66.22	8.55	595 \pm 73.95	14	0.14
21 Pabna	11.75	15.24	571 \pm 58.04	14.44	426 \pm 55.46	145	4.75
22 Rajshahi	16.17	19.71	945 \pm 66.30	18.66	876 \pm 60.64	69	0.77
23 Rangpur	23.06	30.85	1042 \pm 81.07	30.36	1052 \pm 75.47	-10	0.09
24 Tipperah	16.20	19.62	1085 \pm 79.06	19.41	1105 \pm 67.82	-20	0.19
25 24 Pargana	28.63	19.66	1266 \pm 90.56	22.96	1218 \pm 105.15	48	0.35
All districts	455.78	505.07	22494 \pm 400.73	501.07	21903 \pm 378.27	591	1.08

Sahy.

Comparison of acreage estimate based on different sources : Table (2.9)

shows acreage estimates based on duplicated grids enumerated by each party in cols. (4) and (5) and average of duplicated grids in col.(6); and those based on all grids in col.(7). Corresponding official estimates and Settlement figures are given in cols.(8) and (9). The sample survey duplicated grid estimate is 224 lakhs of acre, and all grids estimate 222 lakhs of acre against an official (So-called "complete enumeration") estimate of 207 lakhs of acre.

Comparison of acreage estimates obtained through different sources is difficult or practically impossible owing to discrepancies in total areas of districts used by different authorities. I referred this matter to the Department of Agriculture on 21 August 1944. This matter is of great importance in the area method of sample surveys as the average proportion of land under a particular crop has to be multiplied by the total geographical area in order to get the total crop acreage. If there is any uncertainty in the geographical area of the district it is inevitable that estimates of crop acreage would also be affected by the same degree of uncertainty.

Yield and outturn of Aman paddy, 1944 : Table (2.10) shows the yield and outturn figures for Aman paddy by districts. The number of zones, grids, plots, on the materials of which the figures are based are shown in Table (2.4). In Table (2.10), cols.(5) - (4) give the number of cuts of different sizes on which the yield rate and outturn is based. Cols. (6) and (7) give the yield of rice (not in husk) with standard error per acre, is estimated separately from cuts of size 5.2 x 5.2 and 10 x 10 sq.ft.

As in the case of Aus paddy, over estimation is noticed in the case of smaller cut-size. The district yield rate based on 10' x 10' cut is found to vary from 6.5 to 11.5 maunds, and the weighted mean yield rate for the province comes out as 8.9 maunds per acre. The total outturn of rice (not in husk) is shown by districts in col. (8). The total outturn of rice (not in husk) for the province is shown 706 lakhs of maunds including 96 lakhs of maunds of broken rice.

Bengal Crop Survey: Aman, 1944-45
Table (2.9) Comparison of different estimates of area under Aman Paddy.

Districts	Number of grids		Area under Aman in thousand acres based on					
	Total	Duplicate	Duplicate grids			All grids	Official estimate	Settlement
			A-Party	B-Party	Combined			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1 Bakarganj	4827	644	1623	1578	1661	1516	1543	1313
2 Barakura	4151	212	770	793	782	712	576	440
3 Birbhum	3058	288	688	636	662	714	724	610
4 Bogra	2508	176	582	592	587	570	561	502
5 Burdwan	4579	364	962	959	961	1070	966	783
6 Chittagong	1248	196	457	464	461	492	672	564
7 Chittagong Hill	-	-	-	-	-	-	-	-
8 Dacca	4338	200	1000	925	963	922	819	732
9 Darjeeling	-	-	-	-	-	-	-	-
10 Durgapur	6655	552	1452	1476	1464	1450	1389	1482
11 Faridpur	3685	228	1005	878	942	989	822	813
12 Hooghly	2017	92	491	501	496	474	423	412
13 Howrah	875	56	234	207	221	227	197	196
14 Jalpaiguri	2685	484	674	628	650	555	521	435
15 Jessore	4738	364	873	828	851	755	652	715
16 Khulna	3676	188	1128	1127	1128	987	1018	905
17 Malda	3437	332	379	536	458	456	420	371
18 Midnapur	7853	372	1937	1916	1926	1946	1678	1537
19 Murshidabad	3362	272	626	527	576	502	435	425
20 Mymensingh	9607	636	2018	2082	2050	1982	1769	1456
21 Nadia	4508	276	482	426	454	477	461	370
22 Noakhali	1738	192	444	510	477	602	670	601
23 Patna	2985	172	597	430	514	498	479	461
24 Rajshahi	3857	228	956	886	920	911	823	823
25 Rangpur	6121	640	996	1089	1040	1047	989	1069
26 West Bengal	3903	320	1090	1016	1053	1095	1009	918
27 24 Parganas	4264	308	1274	1195	1234	1242	1239	1173
All Districts	108658	7732	22736	22805	22471	22201	20675	19074

Satyajit

As already mentioned, dry weights were recorded for a certain proportion of sample-cuts in previous years, and a conversion factor of 0.845 was used to convert weights of "green" paddy into corresponding weights of dry paddy.

A special study was conducted this year to determine the actual percentage of rice (not in husk) that was recovered during the husking process. Extensive experiments were made with 596 samples, each weighing one pound of dry paddy, in 58 different centres all over Bengal. The result of the experiment is shown in Table (2.11). Col.(1) shows the number of camps where husking operations were tried and col.(3) gives the number of samples of dry paddy (each of one pound) taken. Cols.(4) - (9) give the proportion of different ingredients such as full rice, broken rice, husk, tuck etc. In converting the yield and outturn of dry paddy these ratios were used.

Bengal Crop Survey 1944-45

Table (2-B) Results relating to extraction of rice not in husk from paddy.

Districts	Number of		Weight in mds per 100 mds of dry paddy of						
	Camps	Samples	Full rice	Broken rice	Sub-Total	Kura	Tual	Wasty	Total dry paddy
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Bakarganj	4	60	62.8	3.3	66.1	3.4	20.9	9.6	100.00
Bankura	2	28	61.3	4.9	66.2	10.0	21.3	2.5	100.00
Birbhum	2	21	63.6	1.5	65.1	2.1	25.5	7.3	100.00
Bojra	2	19	65.7	1.2	66.9	10.6	19.5	3.0	100.00
Burdwan	3	35	57.9	3.2	61.1	7.4	18.7	12.8	100.00
Chittagong	1	11	63.6	1.7	65.3	12.8	17.4	4.5	100.00
Dacca	5	35	66.7	3.6	72.3	6.4	19.2	2.1	100.00
Dizajpur	4	45	63.7	2.6	66.3	5.2	23.5	5.0	100.00
Faridpur	1	19	61.7	4.0	65.7	5.3	25.1	3.9	100.00
Hoghtly	1	12	63.8	2.7	66.5	10.9	17.5	5.1	100.00
Jalpaiguri	1	14	66.0	0.9	66.9	0.5	31.4	1.2	100.00
Jessore	4	36	65.6	2.0	67.6	4.0	22.4	5.8	100.00
Kulna	1	12	63.6	1.6	65.4	9.4	20.2	5.0	100.00
Malda	2	23	66.1	2.5	68.6	6.1	20.5	4.8	100.00
Midnapore	5	63	65.3	1.9	67.2	12.4	16.8	3.6	100.00
Murshidabad	1	12	64.2	5.2	69.4	5.5	22.6	2.5	100.00
Nymet Singh	4	42	64.1	5.1	69.2	6.1	21.6	2.1	100.00
Nadia	1	22	66.1	2.1	68.2	9.1	20.2	2.5	100.00
Pabna	1	19	65.4	2.2	67.6	10.1	18.2	4.1	100.00
Rajshahi	1	12	65.4	1.8	67.2	3.1	28.0	1.7	100.00
Rangpur	2	16	64.4	1.6	66.0	11.0	20.5	2.5	100.00
Tipperah	2	14	61.4	5.3	66.7	5.8	26.1	1.5	100.00
24 Parganas	2	26	67.2	2.7	69.9	4.4	22.1	3.6	100.00
All Districts	52	598	63.3	2.9	66.2	6.7	21.1	6.0	100.00

Shankar