REPORT

OF

THE TECHNICAL COMMITTEE

ON

CROP ESTIMATES

GOVERNMENT OF INDIA
PLANNING COMMISSION

PLANNING COMMISSION
NEW DELHI
August 12, 1967

To

The Deputy Chairman,
Planning Commission,
New Delhi.

Dear Sir,

The Report of the Technical Committee on Crop Estimates appointed by the Planning Commission is submitted herewith.

Yours faithfully,

S. R. SEN

Chairman
Technical Committee
on Crop Estimates

CONTENTS

CHAPTER I : INTRODUCTION

1. The problem

1.1 Statistics of area and production of crops are available in recent years from two sources. One source is the State Governments which furnish these figures to the Ministry of Agriculture which, in turn, compiles the all-India crop estimates. These are known as "official estimates". The second source is National Sample Survey (NSS) which carries out a land utilisation and crop-cutting survey as part of its regular rounds of multi-subject socio-economic surveys, under the technical guidance of the Indian Statistical Institute (ISI). The NSS series of area and production which are available for seven principal cereals are referred to as "NSS estimates".

1.2 The official estimate of production of any given crop is obtained as the product of the area under the crop and the yield rate. The area under the crop is ascertained in all States, except Kerala, Orissa and West Bengal, almost wholly by field to field enumeration by the State Revenue agency according to procedures laid down by the Department of Revenue/ Land Records/Statistics. Crop area in Kerala, Orissa and West Bengal is estimated through sample survey conducted by the respective State Statistical Bureaus. The yield rate of the crop is based on the results of crop-cutting experiments by random sampling technique. All States, except Orissa and West Bengal, follow the method of crop-cutting experiments initially developed by the Indian Council of Agricultural Research (ICAR), in which the sample harvest is generally made on rectangular cuts of size $33' \times 16\frac{1}{2}'$. Orissa and West Bengal, on the other hand, follow the technique developed by ISI, using circular cuts of radii 4′ and 5′ 6″ respectively. The field work of crop-cutting experiments is carried out by the staff of the State Departments of Revenue, Agriculture or others as a part of normal departmental activity in all States, except Assam, Kerala, Orissa and West Bengal. In the latter, this work is entrusted to whole-time investigators working directly under the State Statistical Bureaus. The ICAR was previously responsible for providing technical advice and for supervising the field work of crop-cutting surveys in all States, except Kerala, Orissa and West Bengal. From 1953 onwards, these functions are being discharged by the Agricultural Statistics Division (ASD) of the Directorate of NSS. The State crop-cutting surveys now cover all principal food and non-food crops.

1.3 The NSS estimates of crop production are based on land utilisation survey (l.u.s.) and crop-cutting experiments which have been a part of the multi-subject socio-economic surveys. The NSS estimates of area under the crop are obtained by direct physical observation of the land utilisation from sample clusters of plots (survey numbers) in sample villages. The yield rates are obtained by crop-cutting experiments in a sub-sample of plots by harvesting the crop in circular cuts of radius 4′. Selection of villages and clusters of plots and the location of cuts are by probability sampling. The ISI, in consultation with the Central Statistical Organisation (CSO), looks after the technical aspects of the survey, while the Directorate of NSS is in

charge of the field work with the exception of West Bengal where the ISI is responsible for the field work also. The l.u.s. and the crop-cutting experiments during the earlier rounds of the NSS were of an exploratory nature. From the thirteenth round (1957-58) onwards, firm estimates of area and production at the all-India level are available for the seven principal cereals: (i) rice, (ii) wheat, (iii) jowar, (iv) bajra, (v) maize, (vi) ragi and (vii) barley.

1.4 The States have a collaborating programme of socio-economic surveys with identical technical and field procedures as followed in the NSS. These surveys are carried out on a matching sample (termed as the State sample) of almost the same size as canvassed by the Government of India through the Directorate of NSS (termed as the Central sample). Organisation of field work and subsequent processing and tabulation of data of the State sample are looked after independently by the State Statistical Bureaus. The results of the crop survey from the State sample provide an independent set of crop estimates but these have not yet become available for all the States and years.

1.5 The NSS (Central sample) and official estimates of production for the seven cereals were observed to differ from each other substantially in the same direction since the inception of the NSS series. The magnitude of this difference was much larger during the initial period (1957-58 to 1961-62) when it ranged between 15 and 24 million tons. The difference narrowed down in the subsequent period (1962-63 to 1965-66) to 5 to 8 million tons. In terms of percentages, the NSS estimate was higher than the official estimate by 22 to 36 per cent during the initial period and 8 to 13 per cent in the subsequent period. The large divergence between the two sets of estimates, particularly in the initial period, called for a critical examination of the two series and the possible sources which might have contributed to the difference.

2. Genesis of the Technical Committee

2.1 The factors which might have contributed to the large difference between the two series of crop estimates came up for consideration at several technical meetings. This was first discussed in May, 1959, at a meeting of the NSS Programme Committee for the fifteenth round and later again in September, 1959, when the tabulation programme of the fifteenth round was considered. In the wake of these discussions, the CSO set up a Working Group consisting of the representatives of Ministry of Food and Agriculture, ISI and NSS to examine this question further. The Working Group met several times and had also the benefit of consulting Dr. Frank Yates, FRS, on this subject. Several possible factors were listed as being responsible for the high range of difference between the two estimates, among which the size of the cut used for crop-cutting experiments figured prominently. The Committee expressed the view that a special study under the joint technical auspices of the Ministry of F&A, CSO and ISI would be necessary to examine the influence of the size of cut on the estimate of yield rate. It recommended the use of both types of cuts in the same set of fields as also the harvesting of whole fields. Estimation procedures adopted in the two series were also to be examined particularly with reference to the treatment of mixed crops.

2.2 The wide margin of difference between the two series of crop estimates came up for discussion at a meeting of the Planning Commission in September, 1960, presided by the Prime Minister, which decided that a

committee of senior officials should look into this matter. Accordingly, Secretary, Planning Commission; Secretary, Department of Agriculture; Secretary, Department of Food; Director, CSO; and others met on the 9th September, 1960, and decided that:—

(i) the CSO should suggest a programme of technical studies which would help to identify the reasons for the discrepancy; and

(ii) the NSS land use and crop-cutting surveys should continue on an enlarged scale for a period of three years, to provide firm estimates at the all-India, State and regional levels.

A scheme was accordingly prepared by the CSO in consultation with the Honorary Statistical Adviser to the Cabinet which envisaged the following three studies:—

Type 1—Joint crop-cutting experiments by both (ISI and ICAR) techniques under close and joint supervision of the two agencies, the work being somewhat analogous to experiments conducted under laboratory conditions;

Type 2—Joint experiments by both techniques under normal field conditions with prevailing scales of supervision;

Type 3—Full scale sample survey adequate to determine the area, yield rate and production of crops at the State and regional levels.

Harvesting of whole field from a sample of fields selected for type-2 studies was also recommended in order to provide a comparison of the yield rates from the two techniques with the yield rates obtained by whole-field harvesting.

2.3 Type-1 study mentioned above was more or less similar to the studies suggested earlier by the Working Group. Such joint experiments were conducted in common sets of fields in Bundi (Rajasthan) on kharif jowar in November-December, 1960, and at Barh (Bihar) on wheat in February-April, 1961. The results of the studies were considered by a joint committee consisting of representatives of the Ministry of F&A, CSO and others which endorsed the organisation of type-2 studies. It also detailed the aspects which required examination in respect of the analysis of the two series of estimates.

3. Terms of reference and composition of Technical Committee

3.1 This Technical Committee was set up by the Planning Commission in January, 1963, to bestow continuing attention to the various studies proposed above. The Committee was, in particular, required to:—

(i) examine the results of type-1 studies undertaken in Rajasthan and Bihar;

(ii) formulate the detailed proposals for type-2 studies (to be undertaken along with the eighteenth round (1963-64) of the NSS);

(iii) consider the schedules and instructions of the NSS crop survey for the eighteenth round for ensuring appropriate comparison between the two series; and

(iv) study the data collected by the NSS in the past and the results of any other enquiries and surveys with a view to suggesting improvement in the existing agricultural statistics.

3.2 The Technical Committee consisted of the following members:—

1. Dr. S. R. Sen, Planning Commission—Chairman.
2. Shri D. P. Singh, Planning Commission.
3. Dr. V. G. Panse
4. Shri S. C. Chaudhari } Department of Agriculture.
5. Dr. K. R. Nair
6. Dr. Uttam Chand } Central Statistical Organisation.
7. Shri R. Prasad, National Sample Survey.
8. Prof. D. B. Lahiri
9. Dr. M. N. Murthy } Indian Statistical Institute.

The Committee was re-constituted in August, 1966, by adding Dr. G. R. Seth, Statistical Adviser, Institute of Agricultural Research Statistics, and by replacing Shri D. P. Singh by Dr. R. S. Singh, Shri S. C. Chaudhari by Shri J. S. Sarma, Dr. Uttam Chand by Shri V. R. Rao and Shri R. Prasad by Shri S. P. Pande as the earlier incumbents had left the respective organisations which they represented at the time of initial constitution of the Committee.

4. Meetings of the Committee

4.1 The Technical Committee held eight meetings. At its first meeting in January, 1963, the Committee discussed the design, schedules and instructions for the crop survey of the eighteenth round of the NSS. At its second meeting held in April, 1963, the Committee finalised the programme of type-2 studies which were to be carried out on five crops in five different States as follows:—

crop	*state*
1. rice	Andhra Pradesh
2. maize	Bihar
3. jowar	Madhya Pradesh
4. bajra	Maharashtra
5. wheat	Uttar Pradesh

4.2 The Technical Committee at its third meeting in August, 1963, discussed the conceptual and operational details of type-2 studies with particular emphasis on the concept of whole-field harvest, and laid down guide lines for the conduct of field work. At its fourth meeting in December, 1964, the Committee considered the reports on the type-2 studies in Bihar and Andhra Pradesh. The Committee also suggested further studies on the primary data of both the NSS and the official series for the years 1961-62 to 1963-64 in respect of crops and the States where type-2 studies have been conducted or proposed to be conducted. The three technical institutions

represented on the Committee, *viz.*, ISI, Institute of Agricultural Research Statistics (IARS) and NSS were required to undertake these studies and also a continuous study on other factors which were likely to contribute to the difference between the two series. The Committee recommended that a whole-time statistician should be set apart by each institution for these studies.

4.3 There was some unavoidable delay between the fourth and fifth meetings of the Committee as the type-2 studies on wheat and jowar which were to be organised subsequently, took quite some time to be completed. It was also considered desirable to examine the NSS estimates for the years 1963-64 and 1964-65. The Committee could, therefore, meet only in September, 1966, after all this material became available. At its fifth, sixth and seventh meetings held in September and October, 1966, the Committee considered the reports on the type-2 studies as well as other material placed before it which had a bearing on type-3 studies. The Committee finalised its report in the eighth meeting held in August, 1967.

5. Acknowledgements

5.1 The Committee wishes to place on record its appreciation of the cooperation extended by the State Governments of Andhra Pradesh, Bihar, Mysore, Rajasthan and Uttar Pradesh in organising the type-1 and type-2 studies. The Committee also acknowledges with thanks the valuable assistance rendered by the Indian Statistical Institute, Institute of Agricultural Research Statistics, Directorate of Economics and Statistics (Ministry of Food & Agriculture), Directorate of National Sample Survey and the Central Statistical Organisation in assisting the work of the Committee and in the critical examination of data. The Committee did not have a secretariat of its own and the bulk of the work of tabulation and analysis as well as typing had to be shared by the participating organisations. In particular, the following members of these institutions deserve special mention:—

Sarvashri R. P. Saha and S. B. Pillai (ISI);

Dr. Daroga Singh, Sarvashri K. S. Krishnan and P. N. Bhargava (IARS);

Shri R. Giri (Dte. of E. & S.);

Sarvashri J. Prasad, R. Raghunathan and K. M. Bashir (Dte. of NSS);

Sarvashri V. N. Murthi, M. N. Kapur, S. Kallat, K. S. Krishnaswamy, D. R. Taneja and Sewa Nand (CSO).

5.2 The Committee was greatly helped in its work by the technical notes prepared by its Member-Secretary, Shri V. R. Rao. The research work as also the secretariat work of the Committee was organised by him in a most competent manner.

5.3 Dr. V. G. Panse and Dr. R. S. Singh could not participate in the final deliberations of the Committee and sign the report as they had retired from service.

CHAPTER II: TPYE-1 AND TYPE-2 STUDIES

1. Type-1 studies

1.1 The scheme of type-1 studies envisaged comparison of yield rates based on circular cuts of radius 4′ and rectangular cuts of size 33′ × 16½′ from the same set of fields. The studies were to be confined to a few selected fields from two or three adjacent villages and carried out with maximum care and attention to guarantee precision at all operational stages. Harvesting of whole fields (from which the sample cuts were taken) was also recommended as a control.

1.2 The first type-1 study was conducted on kharif jowar (sown in mixture) in November-December, 1960, in two villages near Bundi (Rajasthan). The second type-1 study was carried out in the rabi season of 1960-61 on wheat and barley at Barh (Bihar). Technical details of both the studies were drawn up jointly by the ISI, NSS and the State Governments concerned in consultation with the CSO. Field staff belonging to the State Governments, NSS and ISI participated in the programme and supervision was provided for by the respective agencies.

2. Bundi Study

2.1 The Bundi study on jowar was planned in 60 fields but finally carried out in 58 fields. In all 348 circular cuts were taken at the rate of 6 cuts per field and 116 rectangular cuts at the rate of 2 cuts per field. Of the 348 circular cuts, half the number was taken by the NSS (socio-economic) investigators and the remaining half by ISI investigators, these two sets of investigators being designated Party 1 and Party 2 respectively. Of the 116 rectangular cuts, half the number was taken by the staff of Agricultural Statistics Division of the NSS and the remaining half by the staff of the State Government who were similarly designated Party 1 and Party 2 respectively for rectangular cuts. In the same set of fields, the NSS (socio-economic) and ISI investigators took circular cuts while the NSS (ASD) and State staff took rectangular cuts. Harvesting of whole fields, which was to be part of the programme could not be undertaken.

2.2 The analysis of the data from the Bundi study was made independently by the ISI and the NSS. The results obtained by the two institutions are summarised below:—

TABLE (2.1): *Gross yield per acre of jowar in kgs., Bundi* (1960)

agency	average yield (kgs./acre)		standard error (kgs.)	
	NSS	ISI	NSS	ISI
(1)	(2)	(3)	(4)	(5)
rectangular cut				
NSS (ASD)	69·0	69·0	7·2	7·2
state	66·5	66·5	6·7	6·7
combined	67·7	67·7	5·9	5·9
circular cut				
NSS (SE)	67·1	67·1	6·6	5·1
ISI	69·7	69·7	6·7	6·4
combined	68·4	68·4	5·9	5·7
difference between rectangular and circular cuts				
combined	0·7	0·7	5·2	5·2

Both the institutions observed that the estimates of yield rates based on rectangular and circular cuts were in fairly close agreement. The yield rate of jowar (per acre of gross area) from the circular cut was obtained at 68.4 kgs. with a standard error of 5.9 kgs., while the yield rate from the rectangular cut was estimated at 67.7 kgs. with a standard error of 5.9 kgs. The difference of 0.7 kg. between the two estimates carried a standard error of 5.2 kgs. and was not significant. Party differences were also found to be quite small in the case of both circular and rectangular cuts.

3. Barh Study

3.1 This study was carried out in a compact area covering three villages near Barh in Patna district. A two-stage sampling design with the field as the first stage unit and the sample cut as the second stage unit was adopted for the study. The fields were selected with probability proportional to gross area under wheat and/or barley (with or without other crops) and with replacement.

3.2 In all, 40 investigators participated in the field work. Of these, 18 were from the State and the remaining from NSS and ISI. Half of the number of investigators (6 from State and 7 each from NSS and ISI) took the circular cuts and the remaining half (12 from the State and 4 each from NSS and ISI) took the rectangular cuts. Each investigator was assigned 16 fields in each of which he was required to conduct experiments using only one type of cut. Adequate supervision was provided by the technical officers of the NSS, ISI and the State Government.

3.3 Altogether 320 fields growing wheat and/or barley with or without other crops were selected. In each field, a pair of investigators of the same or different agencies took the sample cuts. The sample fields were divided into five sets and further split up into sub-sets in order of their selection. Each sub-set except those of set (5) were in turn split up into two subsamples of 16 fields, each of which was allotted to a single investigator. The distribution of the number of sample fields under various categories is given below:—

TABLE (2.2): *Distribution of fields in sub-sets by agency and type of cut, Barh* (1961)

set of fields	order of selection	NSS		ISI		state	
		circle	rectangle	circle	rectangle	circle	rectangle
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1(*a*)	1—32	32	..	..	..	..	32
(*b*)	33—64	..	..	32	..	..	32
2(*a*)	65—96	32	32	..	..	..	..
(*b*)	97—128	..	..	32	32	..	..
(*c*)	129—160	..	..	..	..	32	32
3(*a*)	161—192	32	..	..	..	32	..
(*b*)	193—224	..	..	32	..	32	..
4(*a*)	225—256	..	32	..	..	..	32
(*b*)	257—288	..	..	..	32	..	32
5(*a*)	289—304	16	..	..	..	..	16
(*b*)	305—320	..	..	16	..	..	16
		112	64	112	64	96	192

3.4 In the fields of the first and fifth sets, which together consisted of 96 fields, experiments were conducted on circular cuts by the NSS and ISI on 48 fields each, and on rectangular cuts by the State investigators in all the fields. In the fields of the second set, which also consisted of 96 fields, two circular cuts and one rectangular cut per field were taken by the same agency—each agency doing the work in one sub-set of 32 fields. In the third and fourth sets (which consisted of 64 fields each) a pair of investigators, one from NSS/ISI and the other from the State Government, worked together. From fields of the third set, both investigators took circular cuts and from those of the fourth set, only rectangular cuts.

3.5 Out of a total of 960 cuts from 320 fields, data were collected for 912 cuts in 304 fields. Whole-field harvesting could be carried out in only 9 out of the 16 fields selected for the purpose. The data were analysed independently by ISI, NSS and also the IARS. The results of analysis by the three institutions are summarised in tables (2.3) and (2.4) below:—

TABLE (2.3): *Gross yield rate of wheat, Barh* (1961)

set of fields	field agency	type of cut	yield rate (kgs./acre)			standard error (kgs.)		
			NSS	ISI	IARS	NSS	ISI	IARS
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1(*a*) & 5(*a*)	NSS	circle	301	301	..	39	38	..
	State	rectangle	272	272	..	32	32	..
1(*b*) & 5(*b*)	ISI	circle	239	239	..	32	32	..
	State	rectangle	235	234	235	27	27	27
1(*a*), 1(*b*), 5(*a*) & 5(*b*)	NSS& ISI	circle	270	270	..	25	25	..
	State	rectangle	254	253	..	21	21	..
2(*a*)	NSS	circle	247	247	247	27	27	27
	NSS	rectangle	233	233	..	30	30	..
2(*b*)	ISI	circle	285	285	..	41	41	..
	ISI	rectangle	290	290	..	40	40	..
2(*c*)	State	circle	302	301	..	44	44	..
	State	rectangle	308	308	308	44	45	45
2(*a*), 2(*b*) & 2(*c*)	NSS, ISI & State	circle	278	278	..	22	22	..
	NSS, ISI & State	rectangle	278	278	..	22	22	..
3(*a*)	NSS	circle	244	244	244	46	..	47
	State	circle	218	219	..	38	..	..
3(*b*)	ISI	circle	275	276	..	37	..	..
	State	circle	246	246	246	37	..	38
3(*a*) & 3(*b*)	NSS & ISI	circle	259	259	..	29	..	..
	State	circle	232	232	..	27	..	..
4(*a*)	NSS	rectangle	222	223	..	31	..	..
	State	rectangle	206	206	206	28	..	28
4(*b*)	ISI	rectangle	264	264	..	50	..	..
	State	rectangle	277	277	277	55	..	55
4(*a*) & 4(*b*)	NSS & ISI	rectangle	243	243	..	29	..	..
	State	rectangle	241	241	..	31	..	..

TABLE (2.4): *Difference in yield rates from circular and rectangular cuts, Barh* (1961)

set of fields	comparison	difference in yield rates (kgs./acre)			standard error of difference (kgs./acre)			student's 't'		
		NSS	ISI	IARS	NSS	ISI	IARS	NSS	ISI	IARS
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1a+5a	circle	29	28·57	20·23	18	17·71	17·62	1·6	1·61	1·66
	v									
1b+5b	rectangle	4	4·71		12	11·85		0·33	0·40	
		16	16·04		11	10·67		1·45	1·56	
2a	circle	14	13·50	13·50	16	16·31	16·31	0·88	0·83	0·83
	v									
2b	rectangle	—5	—4·69		13	13·12		0·38	—0·36	
2a+2b		4			10			0·40		
2c	do.	—6	—6·06	—6·06	14	14·04	14·04	—0·43	—0·50	—0·50
		0	0·54		8	8·36	0	0·06		
	circle	26	25·13	25·22	15		14·78	1·73		1·71
	v									
	circle	29	26·04		18			1·61		
		27	27·04		11			2·5		
4a	rectangle	16	16·42	16·43	13		12·52	1·23		1·31
	v									
4b	rectangle	—13	—13·46		13			—1·00		
4		2	1·74		9			0·22		

3.6 The inferences drawn by the three institutions from the results of analysis were not identical and revealed some differences of interpretation on the influence of the size of cut on yield rates.

3.7 The following are the main findings of ISI:—

(i) When the same agency took both cuts, rectangular and circular, in common fields, the difference in yield rates was not significant. Rectangular cuts gave a higher yield rate compared to circular cuts with both ISI and State agencies. The overall difference pooled over agencies was also not significant.

(ii) When rectangular cuts were taken by the State agency and the circular cuts by NSS or ISI in a set of common fields, the circular cuts gave higher yield rate than the rectangular cuts, but the difference was not significant.

(iii) When circular cuts were taken by two agencies in the same set of fields, the yield rate by the State agency was less than the yield rate by the NSS or ISI agency. When rectangular cuts were taken by two agencies in the same set of fields, the yield rate by the State agency was once again less than the yield rate by the NSS agency but more than the yield rate by the ISI agency.

(iv) All the sets taken together did not represent an orthogonal structure of type of cut and agency. A chi-square analysis based on the estimates of the five available pair-wise comparisons among the six possible combinations showed that the interaction between type of cut and agency was not significant. The main effect of type of cut (averaged over agencies) was not significant, while the main effect of agency (averaged over types of cuts) was significant. Further analysis showed that most of the variation between the agencies is accounted for by NSS and State agencies. This pointed to the importance of "standardising" the agencies such that they are thoroughly conversant with both types of cuts. A rectangular cut in the hands of ISI or NSS and a circular cut in the hands of State investigators had hardly done justice to the basic requirement of the present study.

(v) The ultimate test whether the circular cut over-estimated or the rectangular cut under-estimated the yield rate, lay, however, in ascertaining the 'true' yield rate obtained by whole field harvesting, provided the latter could be conducted under the same conditions and same degree of control under which the sample cuts were taken. In the present study, whole-field harvesting could be attempted in only nine fields. The agreement between the yield rates from the rectangular and circular cuts with that from the whole-field harvest was quite close.

3.8 According to the NSS, the results in the main, indicated that the yield rates by the ISI and State agencies with the type of cut to which they were accustomed (circular and rectanguar cuts respectively) did not reveal any divergence while there was a consistent difference between the NSS and the State agencies whatever be the nature of the cut, the yield rate by the NSS agency being significantly higher than the yield rate from the State agency.

3.9 The IARS observed that the present investigation broadly supported their earlier finding that the small cuts gave significantly higher estimates of yield than the large cuts. An additional finding was that the NSS agency generally over-estimated yield as compared to the State agency and this difference continued to be significant even after eliminating cut differences. The following were advanced in support of the above: —

(a) Comparison between two agencies on the basis of common sets of fields showed that the estimate by the NSS agency was higher than the corresponding estimate by the State agency, the difference being statistically significant. Comparison between the two sets even with inclusion of other (non-common) sets of fields revealed that the difference between the agencies continued to be significant.

(b) With regard to the comparison between two types of cuts, the difference between the two estimates from common set of fields was significant at the 5 per cent level with a one-tail test. The difference was not statistically significant if the comparison includes the results of other (non-common) sets of fields also The evidence was not quite conclusive because of relatively large standard errors to which the estimates were subject.

In drawing their inferences, the IARS excluded the results of the cuts taken by the ISI agency. It was contended that ISI was not one of the recognised field agencies responsible for crop surveys in that State and the present study was intended to observe the differences between the NSS and the State agencies only.

4. **Type-2 studies**

4.1 The type-2 studies envisaged joint crop-cutting experiments by both techniques on a larger scale than in the type-1 studies and on all principal cereal crops. One major difference between the two studies was that the type-2 studies were to be organised under normal field conditions with the same scale of supervision as is usually exercised in the respective surveys under the NSS and official series. The Technical Committee suggested that in order to be able to draw satisfactory conclusions, paired comparisons (between the two types of cuts) should be available for about 150 fields in the case of rice and wheat and for about 250—300 fields in the case of jowar, bajra and maize. The Committee also recommended whole-field harvesting of all the fields selected for crop-cutting experiments, but did not insist upon this in areas where labour shortage or other organisational difficulties might be experienced. It was considered desirable from the operational point of view to select the sample villages for the type-2 studies from the villages already selected for the NSS crop surveys. Selection of fields for experiments within a sample village might be made according to the procedure followed in the State official crop survey.

4.2 Type-2 studies were initially to be organised in five States on five different crops during the period of 18th round of the NSS (1963-64). Of the five States selected, namely, Andhra Pradesh, Bihar, Madhya Pradesh, Maharashtra and Uttar Pradesh, Madhya Pradesh and Maharashtra expressed their inability to organise the studies. One of them was replaced later by Mysore and the studies were finally conducted in the following States on the crops shown against them:—

TABLE (2.5): *Coverage of type-2 studies*

state	crop	year	season
(1)	(2)	(3)	(4)
Bihar	maize	1963-64	kharif
Andhra Pradesh	rice	1963-64	kharif
Uttar Pradesh	wheat	1964-65	rabi
Mysore	jowar	1965-66	kharif

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These studies were carried out under the general guidance of the Technical Committee according to the design, concepts and definitions laid down by the Committee. The data were analysed independently by the ISI, NSS and IARS.

4.3 The studies were confined as proposed, to the sample villages selected for crop-cutting experiments from the Central and State samples of the NSS. The studies were spread over the 18th, 19th and 20th rounds; those in Bihar and Andhra Pradesh related to the 18th round, while those in Uttar Pradesh and Mysore related to the 19th and 20th rounds respectively.

4.4 In each sample village, 2 crop-growing fields were selected according to the State official procedure and in each field both the rectangular and circular cuts were taken by the respective agencies. Whole-field harvesting was organised in a sub-sample of villages. The number of fields selected for paired comparisons and whole-field harvest and the number for which the data were analysed are as follows:

TABLE (2.6): *No. of experiments planned and analysed, Type-2 studies*

state	crop	no. of fields for paired comparisons		no. of fields for whole-field harvest	
		planned	analysed	planned	analysed
(1)	(2)	(3)	(4)	(5)	(6)
Bihar	maize	296	284	202	200
Andhra Pradesh	rice	224	193	112	112
Uttar Pradesh	wheat	164	162	100	94
Mysore	jowar	174	174	152	152

4.5 The reports of the studies in Bihar and Andhra Pradesh, prepared by the ISI and NSS agencies were considered by the Technical Committee at its meeting held on 18th and 19th December, 1964. Subsequently a combined report on the studies in Bihar and Andhra Pradesh was made available by the IARS. Similar reports on the studies on wheat in Uttar Pradesh and jowar in Mysore were prepared by the ISI and NSS while the IARS furnished summary results.

4.6 Results of analysis by the three institutions are presented in the table (2.7). The table shows the estimates of yield rate (in kgs/acre) and corresponding percentage sampling errors, based upon whole-field harvest, State cut and circular cut respectively. The 't' values for the differences between pairs of estimates are also given in the table.

TABLE (2.7): *Estimates of yield rate, percentage sampling error and 't' values based on whole-field harvest, State and circular cuts, Type-2 studies*

state	crop	institution	number of experiments	yield rate (kg/acre)			percentage sampling error			't' value		
				whole field harvest	state cut (2)	circular cut	whole field harvest	state cut (2)	circular cut	whole field v state cut (2)	whole field v circular cut	state cut (2) v circular cut
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
				sample with whole-field harvest								
Bihar	maize	NSS	198	406	454	447	5·2	4·9	5·6	4·43†	2·63†	0·43
		ISI	200	412	459	449	..	5·0	..	4·23†	2·31*	0·60
		IARS	200	412	459	447	5·7	4·8	5·4	4·09†	2·24*	0·67
Andhra Pradesh	rice (1)	NSS	112	894	881	931	4·5	4·8	4·4	0·70	1·52	1·95
		ISI	112	894	881	931	..	..	..	0·62	1·44	1·95
		IARS	112	875	881	931	5·1	5·5	4·6	0·42	2·33*	1·95
Uttar Pradesh	wheat	NSS	94	467	491	488	6·7	6·9	6·7	1·98	1·39	0·52
		ISI	94	461	488	477	..	..	..	2·30*	1·42	0·75
		IARS	92	479	506	492	6·9	7·1	6·9	1·89	1·05	0·88
Mysore	jowar	NSS	152	205	207	202	8·3	9·1	8·6	0·33	0·36	0·51
		ISI	150	206	211	201	..	..	..	0·67	0·32	0·67
		IARS	152	204	210	203	9·0	8·3	5·6	<1	<1	<1
				sample with paired cuts only								
Bihar	maize	NSS	84	..	526	496	..	..	..	..	..	0·88
		ISI	84	..	526	477	..	..	..	..	..	1·59
		IARS	84	..	526	497	..	..	..	..	..	0·83
Andhra Pradesh	rice (1)	NSS	81	..	765	776	..	..	..	..	..	0·41
		ISI	81	..	765	774	..	..	..	..	..	0·33
		IARS	81	..	765	774	..	..	..	..	..	0·34

*Significant at 5 per cent level.

†Significant at 1 per cent level.

TABLE (2.7)—*contd.*

state	crop	insti-tution	number of expe-riments	yield rate (kg/acre)			percentage sampling error			't' value		
				whole field harvest	state cut (2)	circular cut	whole field harvest	state cut (2)	circular cut	whole field v state cut (2)	whole field v circu-lar cut	state cut (2) v circu-lar cut
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
					sample with paired cuts only—(contd.)							
Uttar Pradesh .	wheat	NSS	68	..	432	444	..	..	..	..	..	..
		ISI	68	..	435	451	..	..	..	..	..	0·71
		IARS	68	..	439	456	..	8·4	8·2	..	..	0·63
Mysore . .	jowar	NSS	22	..	189	184	..	..	..	..	..	..
		ISI	22	..	189	184	..	..	..	..	..	..
		IARS	22	..	189	184	..	19·0	19·3	..	..	<1
					all samples							
Bihar . .	maize	NSS	284	..	478	462	..	..	..		..	1·00
		ISI	284	..	479	457	..	..	..	..	..	1·44
		IARS	284	..	479	462	..	4·4	4·8	..	..	1·06
Andhra Pradesh .	rice (1)	NSS	193	..	833	865	..	..	..	..	..	1·75
		ISI	193	..	833	865	..	..	..	..	..	1·76
		IARS	193	..	833	866	..	4·4	3·9	..	..	1·78
Uttar Pradesh .	wheat	NSS	162	..	466	467	..	..	..	..	..	0·08
		ISI	162	..	466	466	..	..	..	..	..	0·02
		IARS	160	..	485	485	..	5·4	5·2	..	..	0·05
Mysore . .	jowar	NSS	174	..	205	199	..	8·4	7·9	..	..	0·6
		ISI	172	..	208	199	..	..	..	..	..	0·7
		IARS	174	..	207	201	..	8·2	7·9	..	..	<1

(1) Rice in husk.

(2) Rectangular in case of all the four States, except U.P. where it is triangular.

4.7 It is observed that in the study on maize (Bihar) the yield rate based upon the whole-field harvest is less than the yield rate based upon the State cut as well as the circular cut according to the analysis by all the three institutions. The differences between whole-field and State cut is significant at 1 per cent level in all the three cases, while the difference between whole-field and circular cut is significant at 1 per cent level in the case of NSS and at 5 per cent level in the remaining two cases. The difference between State cut and circular cut is not significant in all the three cases. The yield rate based on circular cut is observed to be nearer the yield rate based on the whole-field harvest uniformly in all cases.

4.8 In the study on rice (Andhra Pradesh) none of the three differences is found significant by ISI and NSS, whereas two of these differences, one between the whole-field and circular cut and the other between the State cut and circular cut (the latter with one-tail test for both partial and total samples) are found to be significant at the 5 per cent level by IARS. The difference between the State cut and circular cut is found to be almost significant (at the 5 per cent level) by ISI and NSS, for the partial sample with whole-field harvest, the yield rate from the State cut being lower than the yield rate from the circular cut. The yield rate from the whole-field harvest is in between the yield rates from the State cut and the circular cut, but nearer the yield rate from the State cut than the yield rate from the circular cut, in contrast to the finding on maize in Bihar.

The divergence in the conclusion arrived at by the IARS on the one hand and the NSS and ISI on the other was primarily due to an interpretation of the yield data recorded in the primary schedule for whole-field harvest for one village. The IARS felt that there was a possible error in recording as the yield data recorded in terms of the number of bags and the weight of the grain for the two fields were inconsistent and, therefore interchanged the yield data for whole-field harvest between the two fields, while the ISI and NSS did not feel that there was any justification for such an interpretation. The IARS carried out the analysis after correcting the doubtful data and also after rejecting them; and in both the analyses, the conclusion was that the circular cut gave significantly higher yield than the whole-field harvest.

4.9 In the study on wheat (Uttar Pradesh) none of the differences is statistically significant except one difference between whole-field and State cut, which is significant or nearly significant. The yield rate from the whole-field harvest is smaller than the corresponding yield rates from the State and circular cuts. The yield rate from the State cut is slightly higher than the yield rate from the circular cut. The results on wheat are thus similar to those on maize.

4.10 In the study on jowar (Mysore), there is a close agreement between the yield rates from the whole-field, State and circular cuts and none of the observed differences is statistically significant. The yield rate from the whole-field is in between the yield rates from the State and circular cuts, as in the case of the study on wheat though the margins of difference are quite negligible.

4.11 Considering the comparisons between the State and circular cuts based on the larger number of fields (including the sample fields without whole-field harvest) the magnitudes of difference between the yield rates based on the two types of cuts turn out to be quite small in the case of all

crops and statistically not significant. It is also interesting to observe that the State cut gives a slightly higher estimate than the circular cut for maize and a smaller estimate for rice, a finding which is also supported by the evidence of the sample of fields with whole-field harvest. In the case of wheat, there is close agreement between the two estimates while for jowar the State cut gives a slightly higher estimate than the circular cut.

4.12 The findings of type-2 studies are, however, subject to one qualification. It was laid down at the time of organisation of the studies that they should be carried out under normal field conditions and with the usual scale of supervision which, however, could not be secured in practice due to the organisation of whole-field harvest in a large number of villages, where much greater supervisory arrangements were found necessary. Even in the case of the other villages (without whole-field harvest), the field staff was fully aware of the importance attached to the investigation, which might have resulted in greater attention being bestowed to the experiments than what would have been normally done. This was unavoidable, keeping in view the nature of the experiments. The special care, if any, with which experiments were carried out might have some influence on the absolute estimates of yield rates but not on their relative difference.

5. Assessment of the results of type-1 and type-2 studies

5.1 The size and shape of the cut in crop-cutting experiments has long been a subject of considerable interest among research workers and a number of technical papers have been published based on special enquiries. It is a general finding that sample cuts of very small size result in over-estimation of yield rates. According to the Indian Statistical Institute, such bias does not exist for circular cuts of radius 4′ (and in fact, even for smaller cuts) when they are marked by the crop-cutting instruments and procedures evolved by the Institute. According to the Institute of Agricultural Research Statistics, on the other hand, cuts of size less than 100 sq. ft., whatever be their shape, give biased estimates, especially in the hands of State departmental staff using rigid or semi-rigid frames. Type-1 and type-2 studies have, therefore, come to assume great importance in seeking to resolve the difference of views on the subject. Type-1 studies have been organized on a small scale confined to a compact area of one to three villages, and type-2 studies on a State-wide basis. The design and field programme have been carefully laid down by the Technical Committee and the primary data from the studies have been subjected to critical analysis separately by the three technical institutions concerned, namely, the IARS, ISI and NSS (ASD). The evidence of the studies can, thus, be considered to be the best that could be obtained under the present circumstances. The assessment of the results of type-1 and type-2 studies is, therefore, of interest in this context.

5.2 According to the Bundi (type-1) study, the difference between the yield rates based on the circular and State cuts is negligible and is not statistically significant. In the Barh (type-1) study in which experiments were planned on a larger number of fields and where the design provided for a variety of comparisons between types of cuts and types of agencies, the divergence between the cuts is found to be not statistically significant according to the analysis presented by the NSS and ISI. According to the IARS, the differences in yield rates between circular and rectangular cuts are significant at 5 per cent level in the sets of comparisons on common

fields. The IARS has used a one-tail test to assess the level of significance of difference with regard to the size of cut, as according to it, the null hypothesis under consideration is that both the estimates represent the same value as against the alternate hypothesis that the smaller cut gives an over-estimate. The NSS and the ISI have considered it appropriate to use the two-tail test as the alternate hypothesis under consideration should, in their view, be that either cut gives an under-estimate or an over-estimate. Using the two-tail test, it is observed that the difference is not statistically significant. It is also noted that the IARS had not included in its analysis, the primary data obtained by the ISI agency, as it is not a normal field agency in the State concerned. The type-1 study being in the nature of a special investigation, the participation in field work by the ISI agency which has experience of carrying out similar studies elsewhere should not in any way affect the conclusions of the study. There has accordingly been some disagreement among the members of the Technical Committee on the rejection of primary data by the IARS. There is common agreement, however, that in the Barh study, the NSS tended to over-estimate the yield rate in comparison to the State agency. There is also a feeling that the use of circular cuts by the NSS agency has led to higher estimates than the rectangular cuts used by the State agency. Magnitudes of difference are, however, small in relation to the observed standard errors and the above finding can at best be considered as a mere indicatoin of a possible trend to be substantiated or rejected by the evidence from other studies.

5.3 The results of type-2 studies which are available for four different crops, one each from four States with diverse field conditions, do not bring out any marked difference in the yield rates with the two types of cuts. The agreement between the two estimates is quite close and going by the evidence of these studies alone, either cut can be considered almost as good as the other with regard to the bias due to type of cuts. This conclusion is strengthened by the fact that difference in yield rates is not always in the same direction, being positive in the case of two crops and negative in the case of the other two.

5.4 The comparison between the circular and State cuts follows practically almost the same pattern in the partial sample of fields with the whole field harvest. The differences are small and change direction from one crop to another, except in the case of rice (Andhra Pradesh) for which the difference is almost on the verge of significance. Comparisons between the yield rates based on whole-field harvest on the one hand, and the two sample cuts on the other, bring about an unexpected result in maize (Bihar) in which yield rate from the whole-field harvest is found to be significantly less than the yield rate from either of the two sample cuts. The circumstances which gave rise to this discrepancy could not be ascertained fully by the Committee. On the main issue of detection of any possible differences in the estimates due to the two types of cuts, the evidence consistently reveals negligible differences, which are not statistically significant, both in the partial and total samples.

5.5 The conclusion that emerges from the type-1 or type-2 studies is that the large divergence observed between the NSS and official series of production is not ascribable to the difference in the type of cut adopted in the respective series.

CHAPTER III: COMPARISON OF NSS AND OFFICIAL SERIES OF CROP ESTIMATES

1. Type-3 studies

1.1 In addition to the type-1 and type-2 studies the original proposal of the CSO envisaged types-3 studies for a comparison of NSS and official series of area and production estimates on the basis of large scale surveys. With a view to achieving such a comparison, the Technical Committee had recommended that for a few years at least, arrangements should be made in the NSS series to estimate the area under crops by using the same recording and allocation procedures as those adopted in the official system. This was implemented and information collected in the 18th round of the NSS (1963-64) by introducing a separate schedule. The results are yet to be tabulated. The Committee expected that the above schedule would be included in the 19th and 20th rounds also, but unfortunately, it was discontinued after the 18th round, even though the need for canvassing the schedule was emphasized when the programme for these three rounds was discussed.

1.2 One of the principal difficulties in a comparative study of the available estimates of the NSS series with the official estimates is the difference in the concepts of "crop area" followed in the two series, which renders the area estimates from the two sources non-comparable, though the production estimates are comparable. The NSS estimates of area relate to "gross area" under a given crop, i.e. area sown pure with the crop plus the whole area sown with the crop in mixture with other crops. The official estimates on the other hand relate to "net area", i.e. area sown pure with the relevant crop plus the proportionate area assigned to the crop when it is sown in mixture with other crops. The proportionate areas of constituent crops are recorded at the field level by eye appraisal or other means such as seed rates, number of rows, etc., except in the case of a few major crop mixtures in some States, where these proportions are applied at the level of a tahsil or district.

1.3 For the earlier rounds of the NSS, estimates of "allocated area" were also obtained by using a different system of "allocation" than what was in vogue in the official series, but this practice was given up from the 17th round (1961-62) onwards. In the absence of comparable area estimates from the two series, a broad comparison has been attempted by using the NSS estimates of "allocated area" mentioned above. For the years from 1961-62 onwards, allocated areas were worked out by the Committee using an average proportion of allocated to gross area from the results of earlier rounds (vide table 1.5).

1.4 It has not been possible to undertake a detailed examination of all possible sources of divergence between the two series. A study of the trends in the two series and the divergences between them was expected to throw some light on the possible factors, which contributed to the divergences. This report presents the findings of such a limited study of the nature and order of divergence between the two series. These have been examined for each crop at the all-India level and at the level of such States as are important for a given crop.

2. NSS estimates of gross area and production

2.1 The NSS estimates of area and production of 7 cereals are available for a period of nine years from 1957-58 (13th round) to 1965-66 (20th round). These relate to the seven principal crops of rice, wheat, jowar, bajra, maize, ragi and barley. The NSS estimates considered here relate only to the Central sample of the NSS as corresponding estimates from the matching State sample are not available in respect of many States.

2.2 Table 1.1(a) shows the number of sample villages (primary sampling units) selected for land use (l.u.s.) and crop-cutting (c.c.) surveys respectively in the NSS series during the years 1957-58 to 1965-66 and, also, the corresponding number of plot-clusters and plots selected for l.u.s. as well as the number of crop-cutting experiments carried out on each crop. Tables 1.2(a) and 1.2(b) present the NSS estimates of gross area and production for each of the seven cereals during the above period. The percentage sampling errors of the estimates are also given in the tables.

2.3 It will be seen from table 1.1(a) that the number of sample villages for l.u.s. was about 3000 in 1957-58 and of the order of 2500 in the period 1958-59 to 1960-61. The sample was increased to about 3900 and 4200 in 1961-62 and 1962-63 and more substantially to about 8500 from 1963-64 onwards. There were similar changes in the sample of villages selected for c.c. experiments which formed one-third of the l.u.s. sample upto 1962-63 and one-fourth from 1963-64 onwards. In terms of plot-clusters for l.u.s., the sample size was 25,000 in 1957-58 and was reduced to about 15,000 from 1958-59 to 1960-61. There was a substantial increase to over 28,000 clusters in 1961-62 followed by a reduction to 20,000 in 1962-63. From 1963-64 onwards an enhanced size of about 38,000 clusters was adopted. The pattern of change in the number of sample plots for l.u.s. was also similar but the number of plots from 1963-64 onwards was about the same as in 1957-58. The number of crop-cutting experiments varied between 8000 to 9000 during the first three years (1957-58 to 1959-60) and increased substantially thereafter to 13,000 in 1960-61. It was nearly 17,000 in 1961-62 and 22,000 in 1962-63. From 1963-64 onwards a much larger number of 32,000 to 34,000 experiments were carried out per year. The following table summarises the salient changes in the sample size during the nine-year period under study:

TABLE (3.1): *Sample size of l.u.s. and c.c. surveys of NSS series.*

year	number of samples				number of c.c. experiments
	villages		clusters of plots (000)	plots (lakhs)	
	l.u.s.	c.c.s.			
(1)	(2)	(3)	(4)	(5)	(6)
1957-58	3,126	1,042	25·0	2·5	8,273
1958-59	2,616	872	15·7	1·6	9,051
1959-60	2,616	872	15·7	1·6	9,565
1960-61	2,532	844	15·2	1·5	12,843
1961-62	3,888	1,296	28·5	1·8	16,787
1962-63	4,236	1,412	19·8	1·4	21,959
1963-64	8,472	2,118	38·1	2·5	32,402
1964-65	8,472	2,118	38·1	2·5	34,741
1965-66	8,472	2,118	38·1	2·5	34,165

NOTE 1. Footnotes under table 1·1 (*a*) may be seen.
2. Plots in l.u.s. refer to survey numbers.

2.4 The NSS estimates of the total of gross areas under the seven cereals were obtained with percentage sampling errors ranging from 2.1 to 3.1 for the years 1958-59, 1959-60 and 1960-61 and from 1.3 to 1.6 in the remaining years excepting 1961-62, for which the percentage sampling error was slightly higher (2.1 per cent) having been based on a two-thirds sample. The estimates of area under the individual crops of rice, wheat and jowar were obtained with percentage sampling errors ranging between 1.7 and 2.5 during the latest three years (1962-63 to 1964-65)*. In the earlier years also (1957-58 to 1960-61), the estimates for rice had the same order of precision (2.4 per cent to 2.7 per cent) but those for wheat and jowar were subject to sampling errors of 3 to 6 per cent. The sampling errors for the remaining crops were rather large throughout the period of study, except for bajra the estimates for which showed improved precision from 1962-63 onwards (2.8 to 4.6 per cent). The enhancement in sample size did not materially improve the precisions of the estimates for maize, ragi and barley.

2.5 The total of NSS estimates of gross area under the seven cereals registered a steep rise of about 45 million acres (19.1 per cent) from 233 million acres in 1957-58 to 278 million acres in 1959-60. The area remained more or less stationary during 1960-61 and 1961-62, after which followed a decline of 23 million acres (8.4 per cent) in 1962-63. The estimates for the years 1962-63 onwards were of about the same order. Considering the year to year changes, annual increases and decreases were observed in four cases each, the increases having occurred during the years 1958-59 to 1960-61 and in 1964-65. In the case of rice, the area registered a rise from 1957-58 to 1961-62, during which an additional area of 26 million acres (33.9 per cent) was shown to have been brought under rice. This trend was suddenly reversed by a fall of about 12 million acres (11.6 per cent) in 1962-63. Thereafter the area remained stationary during 1963-64 and 1964-65 and decreased slightly (3.6 per cent) in 1965-66. Almost a similar trend was observed in the case of wheat also, though the rate of increase during the earlier years (1957-58 to 1961-62) was not as marked as for rice. The pattern of change in the area of jowar, maize and barley was also about the same as for rice and wheat except that the area began to register a fall from 1960-61 (a year earlier than in the case of rice and wheat), after substantial increases (of 28 to 38 per cent) from 1957-58 to 1959-60. The trend for bajra was somewhat erratic, with a nearly 10 per cent fall in 1958-59 and a balancing rise in 1959-60. There was a sharp fall of about 18.1 per cent in 1961-62 and of 5.3 per cent in 1962-63 followed by rises of 12.6 per cent and 6.3 per cent in 1964-65 and 1965-66. In the case of ragi, which is a sparsely grown crop, the area fluctuated between 5.6 to 7.4 million acres without revealing any perceptible trend.

2.6 The NSS estimates of production for the seven cereals together were obtained with sampling errors ranging between 1.4 and 2.9 per cent over the eight years for which the estimates of sampling errors are available. The estimates for individual crops were however subject to large sampling errors (ranging from 4.2 to 20.4 per cent), excepting for rice in most years and for wheat in the years from 1961-62 onwards. The increase in the size of the sample from 1963-64 had apparently no effect in reducing

*Estimates of sampling errors for the year 1955-56 are not still available.

the margin of sampling error in the cases of jowar, bajra and barley. It may be mentioned in this connection that the sampling errors were computed by making use of the sub-sample differences at the stratum level upto 1959-60 and those at the State level from 1960-61.

2.7 The NSS estimates of production (for the seven cereals) registered an appreciable increase of 22.4 million tons (32.9 per cent) during the years 1957-58 to 1960-61 and a sharp fall of 17.9 million tons (19.8 per cent) in the next two years (1961-62, 1962-63). A subsequent substantial rise of 6.5 million tons (9.0 per cent) in 1964-65 was immediately followed by a drop of 11.1 million tons (14.1 per cent) in 1965-66. The trends in production broadly conformed to those of areas, though the range of variation was wider in production. Whereas area increased by 20 per cent in the first four years (1957-58 to 1960-61) production rose by 33 per cent. A 12 per cent fall in area in the next three years (1961-62 to 1963-64) was associated with a 20 per cent fall in production. The trends of production in the case of rice and wheat broadly conformed to the over-all trend in the production of seven cereals, with a rise from 1957-58 to 1961-62, a sharp fall of almost 16 to 19 per cent from 1961-62 to 1962-63 and a slight recovery thereafter except for 1965-66. In the third major crop of jowar, there was a sharp increase of 2.6 million tons (18.7 per cent) in 1958-59 followed by a decrease of 0.9 million tons (5.7 per cent) in 1959-60. There was a very steep fall of 6.1 million tons (39.8 per cent) from 1960-61 to 1961-62, followed by annual fluctuations of 7 to 15.7 per cent in alternate directions.

3. Official estimates of (net) area and production

3.1 In the official series, estimates of area are obtained by complete enumeration in all States except Kerala, Orissa and West Bengal, where sample surveys provide the estimates. Yield rates are estimated in all States through sample surveys. Table 1.1(b) shows the number of crop-cutting experiments planned and analysed on each of the seven cereal crops during the period of study. The scale of experiments remained broadly the same except for increases due to successive inclusion of the results for Kerala, Orissa and West Bengal in the table.

3.2 Except for Kerala, Orissa and West Bengal, the official estimates of area were not subject to sampling errors, being based on complete enumeration. Estimates of production were, no doubt, subject to such errors as the yield rates were obtained through sample surveys. It was not, however, possible to present the sampling errors of the production estimates in Table 1.3(b), as they were not available for many States. On the basis of available results, these errors are claimed to be of the order of 1 to 3 per cent for individual crops at the all-India level.

Note : The officials estimates of area and production which were examined by the Committee had been revised by the Directorate of Economics and Statistics, Ministry of Food, Agriculture, Community Development and Cooperation, subsequent to the final discussions of the Committee. The revisions were not however of such a nature as to affect the main conclusions of the Committee and hence have been incorporated in the Report (replacing the earlier set of figures) with the permission of the Chairman—V. R. Rao.

3.3 From table 1.3(a), it will be seen that the official estimates of area under the seven cereals fluctuated only a little from year to year, though over the period as a whole a slightly rising trend was perceptible. With the exception of 1958-59 when the area increased by about 3.9 per cent and 1965-66 during which it fell by the same extent, the annual variation during the intermediate years was between 0.3 and 1.8 per cent.

3.4 The area under rice and maize showed gradually increasing trends with annual increases of less than 5 per cent. There were only two instances of decrease (1965-66 for rice and 1963-64 for maize). Wheat area rose by 4.1 million acres (14.1 per cent) from 29.0 million acres in 1957-58 to 33.1 million acres in 1959-60 and after a slight drop of 1.1 million acres (3.4 per cent) in 1960-61, again rose by 1.6 million acres (5.0 per cent) in 1961-62. Thereafter the area remained stationary upto 1964-65 after which it decreased by 1.6 million acres (nearly 5 per cent) in 1965-66. Jowar area showed annual fluctuations of less than 4 per cent in both directions upto 1960-61 after which, a slightly decreasing trend set in. The area in 1965-66 was about the same as in 1957-58. Bajra and ragi did not show any trend but fluctuations of 6 to 10 per cent were noticed in some years. Barley showed a decreasing trend from 1962-63 onwards after an initial increase of 10.1 per cent upto 1959-60 and alternating fall and rise of 5.1 per cent and 3.3 per cent respectively in the next two years (1960-61 and 1961-62).

3.5 The official estimates of production (of the seven cereals) fluctuated more than the area estimates, but the overall picture here too was an increasing trend. Only in two out of nine years (1962-63 and 1965-66 which was a year of drought) did production register a fall from the previous year. The rises in 1958-59 (16.6 per cent), 1960-61 (7.2 per cent) and 1964-65 (9.4 per cent) were marked. The production estimates for rice and wheat broadly followed that same trend as that of all the seven cereals, except for a decrease of 1.0 million tons (8.9 per cent) in wheat production in 1963-64 as against a rise of 4.9 million tons (15.6 per cent) in rice production and of 3.0 million tons (4.4 per cent) for all cereals. In the case of rice, a sharp rise of 5.2 million tons (20.8 per cent) occurred in 1958-59 and a marked rise of 2.9 million tons (9.1 per cent) in 1960-61 was followed by a marked fall of 3.7 million tons (10.5 per cent) in 1962-63. There was sharp increase (15.6 per cent) again in 1963-64 as indicated earlier and also in 1964-65 (5.8 per cent) and a steep decline by 8.3 million tons (21.6 per cent) in 1965-66. Wheat also showed a sharp rise of 1.9 million tons (24.4 per cent) in 1958-59 followed by rises of 6.5 to 9.8 per cent in 1960-61 and 1961-62. In 1963-64 there was a fall as mentioned above, followed by a rise of 24.6 per cent in 1964-65 and a fall of 12.8 per cent in 1965-66. The production of jowar fluctuated widely without showing any specific trend (rise of 14.4 per cent in 1960-61, fall of 18.2 per cent in 1961-62, rise of 19.8 per cent in 1962-63 and fall of 23.1 per cent in 1965-66). Bajra, ragi and barley also showed many marked fluctuations, without revealing a trend. Maize showed an increasing trend, with only one case of fall in production. Marked fluctuations (ranging from 5.7 to 17.6 per cent) were noticed in the earlier years (1958-59, 1959-60, 1961-62, and 1962-63).

4. Comparison of NSS and official series

Production

4.1 An unsatisfactory feature of the crop estimates of the country is the large and persistent divergence between the official and NSS series of

production. The following table presents the absolute differences between the two sets of estimates in respect of each crop and year under study.

TABLE (4.1): *Absolute differences in production estimates of NSS over official series.*

(million tons)

year	rice	wheat	jowar	bajra	maize	ragi	barley	all cereals
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1957-58 . .	2·6	3·2	5·4	1·8	2·2	0·4	0·4	15·9
1958-59 . .	4·6	2·2	7·6	2·2	3·5	0·6	0·7	21·4
1959-60 . .	4·4	3·6	7·1	2·2	3·0	0·7	1·0	22·0
1960-61 . .	7·6	4·8	5·7	1·2	2·5	0·5	1·8	24·1
1961-62 . .	7·1	3·6	1·4	0·3	1·8	0·3	0·7	15·0
1962-63 . .	2·6	2·2	1·2	0·0	1·6	0·0	0·7	8·4
1963-64 . .	1·5	1·0	1·0	0·3	1·2	0·0	0·2	5·1
1964-65 . .	—0·1	2·7	1·6	—0·2	0·8	0·1	0·5	5·3
1965-66 . .	0·7	1·3	3·1	1·0	1·5	0·1	0·3	7·9

It will be seen that the difference between the two sets of estimates of production for the seven cereals together increased from 15.9 million tons in 1957-58 to 24.1 million tons in 1960-61. There was a decline in the next two years 1961-62 and 1962-63, the difference being 15.0 and 8.4 million tons. The difference ranged between 5.1 and 7.9 million tons during the last three years (1963-64 to 1965-66).

4.2 An examination of the differences for individual crops shows that the margin was quite high in the case of rice upto 1961-62. Thereafter, the two series tended to get closer, with remarkable agreement between the two estimates in 1964-65. In the latest year (1965-66), the order of the difference was 0.7 million tons (about 2.4 per cent of the official estimate). The differences between the two series in respect of wheat, jowar and maize on the other hand, continued to be large throughout the period.

Area

4.3 It is of interest to examine the difference in the estimates of production by analysing the respective differences between the two series of areas and yield rates. The task is rendered difficult as comparable estimates of area are not available from the two series. While NSS estimates relate to gross area, the official estimates refer to net area. In order to secure a measure of comparability, "allocated area" from the NSS has been obtained (vide table 1.3(c)) and the absolute differences between this and the official estimate are presented in table (4.2).

TABLE (4.2): *Absolute differences in estimates of allocated area of NSS over official estimates.*

(million acres)

year	rice	wheat	jowar	bajra	maize	ragi	barley	all cereals
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1957-58 . .	—4·9	0·0	—5·7	0·0	—0·3	—1·4	—0·8	—13·2
1958-59 . .	2·7	—1·3	0·4	—0·3	1·3	—0·1	—0·3	2·4
1959-60 . .	4·5	2·4	3·7	3·4	2·1	—0·1	—0·2	15·8
1960-61 . .	11·5	3·0	—2·2	—0·5	1·7	0·0	—0·3	13·1
1961-62 . .	14·6	3·0	—5·1	—5·0	1·3	—0·5	0·0	8·2
1962-63 . .	2·4	—1·3	—5·7	—5·0	0·2	—0·1	0·0	—9·6
1963-64 . .	1·5	—2·4	—7·1	—5·2	—0·1	0·2	—0·3	—13·3
1964-65 . .	—2·7	0·4	—5·4	—4·8	—0·6	—0·4	—0·4	—13·9
1965-66 . .	—2·4	—1·6	—2·5	—2·6	0·8	0·4	—1·0	—8·8

NOTE—NSS estimates refer to allocated areas while official estimates are net areas. The proportions of allocation in the former was estimated for 1961-62 to 1965-66 by using average proportions from the results for earlier years.

4.4 The trend in the differences between areas was somewhat at variance with the one relating to production. During the first half of the period (upto 1961-62), the allocated area in the NSS series was higher than the corresponding official estimate (with the exception of the first year 1957-58), the difference for all seven cereals together ranging between 2.4 and 15.8 million acres. The reverse was the case in the remaining half of the period during which the NSS estimate was less than the official estimate by a margin varying from 8.8 to 13.9 million acres. There were sudden changes in the differences between 1957-58, 1958-59 and 1959-60 as also between 1961-62 and 1962-63. The difference which was 13.2 million acres in the negative direction during 1957-58, was 2.4 million acres in the positive direction during 1958-59 and there was a further increase to 15.8 million acres during 1959-60. Similarly the difference which was 8.2 million acres during 1961-62 in the positive direction came to 9.6 million acres in the negative direction during 1962-63.

4.5 In regard to individual crop comparisons, the trend for rice area was similar to the one for rice production—large differences during 1960-61 and 1961-62 having narrowed down during the subsequent years (1962-63 to 1965-66). The same was not, however, the case with the other crops. In respect of wheat, the differences in area were positive for the years 1959-60 to 1961-62 and negative for the later years, except for 1964-65, whereas the differences in production estimates were positive throughout. This would indicate that differences in yield rates between the two series were much more marked for wheat, the NSS estimate being consistently higher than the official estimate. Such an inference could be drawn in the case of jowar and bajra also, where, having regard to the extent of area under them and the magnitude of observed differences in area and production, the yield rates, according to NSS series, were relatively much higher than the official yield rates.

4.6 A comparison of the estimates of production between the two series at the State level may now be attempted. These comparisons are presented in table 2.3. Though the NSS series was not designed to provide Statewise estimates for individual crops, the enhanced sample size from 1961-62 onward could be considered adequate to furnish estimates for at least all the 7 cereals together, with a fair degree of accuracy. In keeping with the comparison at the all-India level, the NSS estimate of cereal production was relatively much higher than the official estimate for individual States with the exception of Kerala, Orissa and West Bengal. These three States, incidentally, grow mostly rice and not much of the remaining six cereals. Further, as noted earlier, the official estimates of area in the States are obtained through sample surveys unlike the other States.

4.7 A closer examination of the comparisons over years for individual States reveals sustained margins of difference in the case of Assam, Bihar, Gujarat and Maharashtra. In the States of Andhra Pradesh and Madhya Pradesh, the margin of difference between the two series which was wide in the initial years upto 1960-61 got reduced somewhat later, but in the latest year (1965-66) it once against registered a sharp rise. In Mysore on the other hand, there was close agreement between the two series from 1962-63 onwards. In Rajasthan, the margin was rather wide for all years except 1957-58 and 1964-65, whereas in Uttar Pradesh, the margin narrowed down only during the latest year. Madras presented altogether a different picture, the NSS estimate registering a steadily declining trend and the official estimates an increasing trend.

4.8 Subject to the limitations of sample size and precision of the estimates, it is worthwhile to extend the comparative study of the two series to individual States and crops. Such comparisons which are available only from 1960-61 onwards are presented in table 2.2. Even in the case of individual States and crops, there were wide fluctuations in the NSS estimates over years while the differences in official estimates between years were less marked. As regards rice, the difference between the two estimates was consistently large in Andhra Pradesh, Assam and Bihar. In Madhya Pradesh and Maharashtra, the differences were high during the early three years (1960-61 to 1962-63) followed by close agreement in the next two years (1962-63 and 1963-64). During the latest year (1965-66), the margin of difference was again high. In Madras, rice production which was estimated at 5 million tons during 1960-61 according to the NSS, registered a fall of 2 million tons during the following years, whereas the official estimate showed a steady increase over the period.

4.9 The States of Kerala, Orissa and West Bengal (in which both the official and NSS series of area and production were based on sample surveys), presented an entirely different picture from the rest of the States. The NSS estimates were consistently lower than the official estimates in both Kerala and West Bengal, while in Orissa they were so in three out of six years. Both area and yield rates contributed to the differences in Kerala, while area alone was responsible to a large extent for the differences in West Bengal. In Orissa, the yield rates from the NSS series were generally higher than the official estimates except for 1964-65.

4.10 In the case of wheat the production estimates had similar trends in the two series in Uttar Pradesh, the NSS estimates being always higher than the official estimates. In Madhya Pradesh also the trend was similar in the two series (with the exception of 1960-61) although the fluctuation in the NSS series was more marked. In Gujarat and Punjab there was no discernible similarity in the trends in the two series.

4.11 In the case of jowar, the NSS estimates were consistently higher than the official figures throughout the period in all the States except Andhra Pradesh. The trends in the two series were similar only in the case of Maharashtra. In Andhra Pradesh, the NSS estimates registered a steep fall during the first five years (1960-61 to 1964-65) and a sudden increase during the last year (1965-66). In contrast, the official series registered a steady decline.

Yield Rates

4.12 The yield rates of crops from the NSS and official series are not also comparable as the former relate to gross area while the latter refer to net area. However, trends revealed by the yield rates according to the two series may be compared either by taking the absolute yield rates or by converting them into indices. For simplicity of presentation, a comparison of trends has been attempted through indices which are presented in Table 1.4(c).

4.13 In both the NSS and official series, there was a rising trend for rice over the period, though there were fluctuations from year to year in both series. In the case of wheat, the trends in the two series were also similar except that the NSS series showed decrease in 1961-62 (by 6.2 per cent) as compared to an increase in the official series (by 5.7 per cent). For jowar, while the trend in the two series was similar, there was a marked fall (13 per cent) in the yield rate according to the NSS in the first three years (1957-58 to 1959-60) as against a decrease of only 3 per cent in the official series. In the case of bajra, there was an increase in NSS series during the period 1957-58 to 1962-63, with slight fluctuations; the yield rate remaining stationary thereafter. In contrast, there was no perceptible trend in the official series. In respect of maize, there was a decreasing trend in the NSS series, while there was little change in the official series. Annual variations in the yield rate for ragi were more in the NSS series than the official series. For barley, the NSS series registered an increase during the period 1957-58 to 1960-61, a decline thereafter till 1963-64 and a rise in 1964-65. The official series showed a different trend during the initial years 1957-58 to 1961-62. In contrast to the NSS series, there was a fall in the official yield rate in 1959-60 and a rise in 1961-62 as compared to the years immediately before.

4.14 It will be seen from the above study that there were several instances of trends in opposite direction and also widely divergent trends in the same direction between the two series. An attempt has been made to relate these differences in trends with available evidence regarding weather and crop conditions. Tables 4.1 to 4.4(a) present the relevant information. An analysis of the weather and crop conditions tends to show that they were more in accord with the trends observed in the official series of crop area and production rather than those revealed by the NSS series. Similarly, the quantum of per capita availability of foodgrains and its annual variation over the period, according to the official series, appear to be in general conformity with the other evidence on the availability of foodgrains independently*.

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*The representative of ISI expressed reservation on this conclusion as he did not have adequate time to examine it.

5. Summary

The findings of the foregoing study of the NSS and official series of crop estimates for the nine-year period 1957-58 to 1965-66 may now be summarized.

5.1 The area under the seven cereal crops, according the NSS, registered a steep rise during the first three years (1957-58 to 1959-60), remained more or less stationary during the next two years (1960-61 and 1961-62) after which there was a sharp fall between 1961-62 and 1962-63. Since 1962-63 onwards, it almost maintained the same level once again. The official estimate of crop area, on the other hand, fluctuated a little from year to year with a slightly rising trend over the whole period.

5.2 The trends in area of individual crops, according to the NSS, broadly conformed to the overall trend of all the crops together. They were marked by large increases upto 1961-62, sharp fall between 1961-62 and 1962-63 and fairly stationary trend thereafter. Jowar, bajra, maize and barley, however, began to register a fall from 1960-61 onwards. Official estimates of area under individual crops had steadily increasing trends in the case of rice and maize, and almost stationary in the case of wheat, jowar and bajra.

5.3 The trend in production (of seven cereals), according to the NSS series, broadly conformed to the trend of area according to the same series. The absolute range of variation in production was, however, larger than in the case of area. The official estimate of production generally showed an increasing trend, though the annual fluctuations were more than in the case of area. Only in two out of the nine years, did the production register a fall as compared to the previous years.

5.4 The trends of production in the individual cases of rice and wheat (according to NSS) were similar to that of the seven cereals—a rise from 1957-58 to 1961-62, a sharp fall from 1961-62 to 1962-63 and a slight recovery thereafter, except for 1965-66 (which was a year of drought). In the third major crop of jowar, there was a substantial reduction from 1961-62 onwards. The official estimates of production of rice and wheat again followed the same trend as of all the cereals put together, while the production of jowar remained more or less stationary throughout.

5.5 A comparison between the NSS estimate of (allocated) area and the official estimate shows that the former was higher than the latter during the first half of the period (1957-58 to 1961-62) with the exception of 1957-58, and less than the latter in the second half (1962-63 to 1965-66). In regard to individual crop comparisons, large differences were noticed in the area under rice during the initial years which narrowed down subsequently resulting in close agreement in the last few years. The same was, however, not the case with the other crops. In wheat, jowar and bajra, NSS estimates were lower than the official estimates.

5.6 The difference between the NSS and official estimates of production for the seven cereals together was very high during the first five years (1957-58 to 1961-62), varying between 15.9 to 24.1 million tons. There was a sudden and sharp fall in this difference in 1962-63 since when it ranged

between 5.1 and 8.4 million tons. The differences for individual crops were quite high in the case of rice until 1961-62, the two series tending to get closer thereafter. The differences in the case of wheat, jowar and maize, on the other hand, continued to be large throughout the period.

5.7 A Statewise comparison of the estimates of production between the two series shows that the NSS estimates for the seven cereals was much higher than the corresponding official estimates in all States, except Kerala, Orissa and West Bengal. These three States, incidentally, are principally rice-growing States and also base their official estimates of both area and production on sample surveys. Taking rice alone into account, the difference between the two estimates was consistently large throughout the period in Andhra Pradesh, Assam and Bihar. The NSS estimate was consistently lower than the official estimate in Kerala and West Bengal

CHAPTER IV: CONCLUSIONS AND RECOMMENDATIONS

1.1 A striking feature of the NSS and official estimates of production was that they were consistently different throughout the period of study, the former being higher than the latter. The magnitude of this difference was much larger during the earlier period (1957-58 to 1961-62), ranging between 15 and 24 million tons; the difference narrowed down to 5 to 8 million tons in the subsequent years (1963-64 to 1965-66). Even during the later years, while estimates of production of rice revealed fairly close agreement, the estimates for wheat, jowar and maize continued to differ to a marked extent. At the State level, NSS estimates (for 7 cereals) were substantially higher than the official estimates in the case of Assam, Bihar, Gujarat and Maharashtra, and lower in the case of Kerala and West Bengal.

1.2 The divergence between the two series can arise because of differences in the estimates of (a) area and (b) yield rates, which in turn may be due to differences in the technical procedures of selection, compilation, estimation, etc. as also operational differences in the field and processing work. In regard to estimates of area, the different concepts used in the two series, 'gross' in the NSS and 'net' in the official series, were a handicap in ascertaining the reasons for divergence between the two series. The Committee's attempt at securing comparability by having the NSS obtain crop area according to procedures followed in the official series, could not materialize. The wide divergences between the trends of the two series of area estimates, sometimes in contradictory directions, would however tend to the conclusion that area contributed materially to the overall divergence in production.

1.3 Several factors could have accounted for the divergence between the two series of area estimates. In the official series, the practices followed for recording net areas happen to be different from State to State and sometimes even in a State. It is not certain that the procedures laid down in the Land Record Manuals for this purpose are carefully followed by the primary agency and adequate precautions taken in arriving at appropriate net area in all cases. This is a matter for further investigation and improvement, both by laying down well considered concepts and procedures for recording area under crop mixtures and adequate training of the primary staff and supervision over their work. The Committee understands that considerable progress has been made in this direction through the efforts of the Ministry of Food and Agriculture, which need to be pursued actively in future.

1.4 Another factor influencing the official estimates of area could be the cumulative effect of errors in recording, aggregating and transfer of area statistics from village level upto the State level. The number of persons engaged in the compilation of area statistics at various levels is far too large to completely avoid such errors. It should, however, be possible to ensure that the cumulative effect of such errors does not vitiate the accuracy of the final estimates of area at the State level. The Committee intended to have a study undertaken in 3 or 4 States to assess the overall effect of errors in aggregation and transfer. This was ultimately

carried out only in one district of Andhra Pradesh (Nalgonda) for want of time and facilities. The results of this limited study, though not quite representative of conditions obtaining even in Andhra Pradesh, not to speak of other States, did reveal the existence of errors at almost all levels, namely, village, tehsil and district, which could not be completely ignored. The Andhra Pradesh study would thus underline the need for a more detailed investigation on a large scale in this regard.

1.5 One factor affecting the NSS series could be the change in the procedure of building up area estimates from 1961-62. The earlier procedure is known to result in consistent over-estimates as compared to the subsequent procedure. This apparently arose out of inaccuracies in the compilation of geographical area at various levels. A detailed study on the extent of, and the reasons for, these inaccuracies should be undertaken.

2.1 Among the factors contributing to the divergence in yield rates could be the size of the ultimate sample cut used for crop-cutting experiments. From the type-1 and type-2 studies organised at the instance of the Committee on different crops, it was seen that the large divergence observed in the NSS and official estimates of production was not ascribable to the different types of sample cut used in the two series.

2.2 There could be a number of other factors affecting the estimates of yield rates which could not be examined by the Committee. They require laborious and time-consuming studies and the Committee can at best suggest the course of action in this regard for future consideration. One of the possible sources of divergence in the estimates of yield rate is the cumulative effect of various types of non-sampling errors to which both series were subject, such as response rates (proportion of the number of crop-cutting experiments analysed to the number of experiments planned), biases in the selection of sampling units due to departure from strict probability sampling procedures at various stages, biases due to deviations from appropriate procedures of estimation, and the choice of appropriate expansion factors particularly with regard to yield rates of crops sown in mixtures, errors in driage ratios (of dried grain to harvested produce), and finally, the short-comings of the primary field agencies in carrying out the programme of crop cutting work according to prescribed procedures. There has, no doubt, been considerable improvement in the recent years in the quality of field work, response rates and attention to technical details, due to the growing awareness of the importance of crop surveys. Nevertheless, greater attention need to be paid to study the overall effect of varying practices followed for obtaining the yield estimates. In this connection, it will be worthwhile to subject the data of the two series to a critical examination, on the lines indicated in Appendix 10.

3.1 In the view of the Committee, it is important that all possible measures should be taken to improve the quality and timelines of official series of crop statistics, as no other series can ever completely replace the official series. Apart from careful scrutiny of the procedures of compilation and estimation, and securing as far as possible uniformity in concepts and definitions for inter-State comparability, it is necessary to provide for a fairly intensive supervisory check over the primary field work in regard to both area and yield estimates. The normal departmental supervision should be strengthened for this purpose. In order to

ensure objectivity, it should be supplemented by supervision based on a probability sampling, both of field enumeration and compilation procedures, with the help of higher levels of departmental staff (at least at two levels higher than the level of the primary agency). Such supervision will provide the necessary authority for taking corrective measure as well as provide a quality check. There should be a concurrent sample check by a Central agency on a sufficiently large scale to provide estimates of crop area and production at the State and all-India levels for administrative and policy requirements of Government of India.

3.2 Members of the Committee except the representatives from the ISI consider that once the above proposal is accepted and implemented, there will be no need for continuing the present NSS series of crop estimates. The NSS staff which have considerable experience of sample surveys in the field of land utilisation and crop cutting could as well be utilised for the Central sample check. Until the sample check is established, the NSS series may continue during the transitional period which should be kept to the minimum.

1. Sd/- S. R. Sen—*Chairman.*
2. Sd/- K. R. Nair
3. Sd/- D. B. Lahiri
4. Sd/- S. P. Pande
5. Sd/- G. R. Seth*
6. Sd/- J. S. Sarma
7. Sd/- M. N. Murthy
8. Sd/- V. R. Rao

New Delhi,
12*th August,* 1967.

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*Dr. Seth feels that "the persent NSS series should immediately be discontinued. However, until a central agency is established to carry out the proposed sample check scheme as recommended in para 3·1, NSS may be temporarily made responsible for implementing that scheme"

STATISTICAL TABLES

LIST OF TABLES

TABLE 1.1(a)—*Number of sample villages and crop-cutting experiments in the NSS series (central sample),* 1957-58 to 1965-66

year	sample size											
	l.u.s.[1]				number of crop-cutting experiments							
	villages [2]	clusters of plots (000)	plots (lakhs)	no. of c.c. villages [2]	rice	wheat	jowar	bajra	maize	ragi	barley	total (seven cereals)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1957-58 . .	3,126[3]	25·0	2·5	1,042	3,365	1,704	1,479	732	305	291	397	8,273
1958-59 . .	2,616	15·7	1·6	872	3,965	1,449	1,221	720	771	415	510	9,051
1959-60 . .	2,616	15·7	1·6	872	4,166	1,552	1,206	750	833	446	612	9,565
1960-61 . .	2,532	15·2	1·5	844	3,985	2,188	2,168	1,316	1,593	432	1,161	12,843
1961-62 . .	3,888[4]	28·5	1·8	1,296[5]	5,234	3,552	2,632	1,361	1,700	594	1,714	16,787
1962-63 . .	4,236[4]	19·8	1·4	1,412	7,310	3,670	3,972	2,404	2,151	960	1,492	21,959
1963-64 . .	8,472	38·1	2·5	2,118	10,421	5,803	5,386	3,089	3,490	1,91	3,26	
1964-65 . .	8,472	38·1	2·5	2,118	11,181	6,370	5,602	3,933	3,483	1,669	2,503	34,741
1965-66 . .	8,472	38·2	2·5	2,118	10,172	6,313	6,164	3,626	3,044	2,552	2,284	34,155

Note—
(1) l.u.s.—land utilisation survey.
(2) number planned per season.
(3) 1,042 villages only for autumn season.
(4) 2,592 villages only for autumn season.
(5) 864 villages only for autumn season.
(6) 1,412 villages only for summer season.

TABLE 1.1(b)—*Number of crop-cutting experiments planned and analysed in the official series for the 7 cereals, 1957-58 to 1965-68*

year/crop	rice		wheat		jowar		bajra	
	planned	analysed	planned	analysed	planned	analysed	planned	analysed
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1957-58	19,658	15,233	13,437	11,481	15,524	11,809	10,358	7,680
1958-59*	16,146	13,728	14,546	11,900	14,886	10,547	9,880	7,172
1959-60	16,336	13,276	13,278**	11,286	14,580	9,151	9,914	6,903
1960-61	18,660	14,449	13,464	10,666	13,522	8,958	9,552	6,270
1961-62†	28,544	22,158	12,874	10,401	12,454	8,747	8,880	6,271
1962-63	29,939	22,747	12,644	10,450	12,648	9,661	8,876	6,553
1963-64‡	35,028	28,487	13,516	10,893	11,786	8,782	8,072	6,115
1964-65	37,775	31,366	13,380	11,383	11,916	9,166	8,516	6,925
1965-66	38,559	32,766	14,213	11,566	12,254	9,738	8,118	6,639

year/crop	maize		ragi		barley		total (seven cereals)	
	planned	analysed	planned	analysed	planned	analysed	planned	analysed
(1)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
1957-58	4,462	3,436	1,970	930	4,356	3,308	69,765	53,850
1958-59*	5,184	3,978	1,990	856	4,236	3,591	66,818	51,772
1959-60	5,686	4,343	1,832	883	4,324**	4,326	65,950	50,168
1960-61	5,732	4,397	1,802	1,009	5,276	4,426	68,008	50,175
1961-62†	5,928	4,615	1,806	919	5,616	4,642	76,102	57,753
1962-63	6,080	4,772	1,914	1,222	5,474	4,662	76,575	60,067
1963-64‡	5,910	4,841	1,750	1,187	5,639	4,800	81,701	65,105
1964-65	6,447	5,064	1,882	1,443	5,598	4,866	85,514	70,213
1965-66	6,390	5,296	2,202	1,712	5,649	4,757	87,385	72,474

Note—*Jammu and Kashmir included from 1958-59 for rice.
**excluding Bihar for number planned.
† Kerala and Orissa included from 1961-62 for rice.
‡ West Bengal included from 1963-64 for rice, wheat and barley.

TABLE 1.2(b)—*NSS estimates of production of principal cereal crops (central sample)*, 1957-58 *to* 1965-66

(000 acres)

year	rice		wheat		jowar		bajra	
	area	s.e.%	area	s.e.%	area	s.e.%	area	s.e.%
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1957-58 . . .	77,188	2·6	37,204	3·0	49,615	3·8	41,433	
1958-59 . . .	86,648	2·6	39,207	4·9	60,323	4·9	37,428	11·3
1959-60 . . .	91,157	2·7	45,993	3·8	63,725	5·1	40,885	10.2
1960-61 . . .	98,525	2·4	45,638	3·4	60,973	6·3	39,330	8·7
1961-62 . . .	1,03,394	2·5*	48,033	4·0*	54,082	1·7*	32,226	6·0
1962-63 . . .	91,437	2·5	42,701	2·3	52,425	1·9	30,511	3·6
1963-64 . . .	92,276	2·0	40,764	2·1	50,413	2·5	30,188	4·6
1964-65 . . .	89,865	1·7	44,332	2·5	52,642	1·9	34,002	2·8
1965-66 . . .	86,731	N.A.	39,526	N.A.	53,964	N.A.	36,151	N.A.

year	maize		ragi		barley		total (seven cereals)	
	area	s.e.%	area	s.e.%	area	s.e.%	area	s.e.%
(1)	(10)	(11)	(12)	(31)	(14)	(15)	(16)	(17)
1957-58 . . .	11,138	7·2	5,625	7·2	11,214	4·1	233,417	1·6
1958-59 . . .	14,530	8·4	7,052	13·5	13,653	6·8	258,841	2·4
1959-60 . . .	15,337	7·9	6,710	10·1	14,212	6·2	278,019	2·2
1960-61 . . .	15,148	3·0	7,363	7·4	13,332	8·5	280,309	3·1
1961-62 . . .	14,940	6·5*	6,661	6·6*	14,044	3·1*	273,380	2·1
1962-63 . . .	13,987	6·3	6,484	4·0	12,845	6·9	250,390	1·5
1963-64 . . .	13,564	5·4	7,158	4·2	11,258	5·7	245,621	1·3
1964-65 . . .	12,999	7·0	6,597	5·7	10,666	5·1	251,103	1·4
1965-66 . . .	14,942	N.A.	6,787	N.A.	9,216	N.A.	247,317	N.A

NOTE—1. The area estimates for the years 1957-58 to 1961-62 do not include summer season.
2. *The sampling errors for 1961-62 are based on two sub-samples only (out of three).

TABLE 1.2(b)—*NSS estimates of production of principal cereal crops (central sample), 1957-58 to 1965-66.*

(000 tons)

year	rice		wheat		jowar		bajra	
	production	s.e.%	production	s.e%	production	s.e.%	production	s.e.%
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1957-58 . . .	27,709	3·4	11,053	4·5	13,876	5·5	5,323	11·9
1958-59 . . .	34,924	3·3	12,021	7·4	16,466	6·2	6,018	9·0
1959-60 . . .	35,600	3·7	13,764	6·0	15,532	9·4	5,640	11·4
1960-61 . . .	41,608	2·3	15,623	6·4	15,393	9·4	4,479	4·8
1961-62 . . .	42,166	2·3	15,440	3·3	9,264	7·9	3,893	9·7
1962-63 . . .	33,985	4·3	12,897	3·2	10,717	5·5	3,766	9·8
1963-64 . . .	37,846	3·9	10,712	1·8	9,968	4·2	3,963	10·1
1964-65 . . .	38,298	2·1	14,755	3·1	11,176	8·6	4,202	8·1
1965-66 . . .	30,349	N.A.	11,883	N.A.	10,437	N.A.	4,504	N.A.

year	maize		raqi		barley		total (seven cereals)	
	production	s.e.%	production	s.e.%	production	s.e.%	production	s.e.%
(1)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
1957-58 . . .	5,266	8·4	2,183	8·6	2,654	6·9	68,064	2·3
1958-59 . . .	6,918	9·6	2,566	7·8	3,370	12·3	82,283	2·5
1959-60 . . .	6,962	8·9	2,693	9·1	3,671	8·9	83,862	2·8
1960-61 . . .	6,522	7·6	2,317	14·7	4,530	20·4	90,472	2·9
1961-62 . . .	6,034	9·5	2,284	11·6	3,771	2·9	82,852	1·8
1962-63 . . .	6,147	8·3	1,928	7·3	3,131	3·8	72,571	2·5
1963-64 . . .	5,648	4·5	1,860	5·1	2,244	6·7	72,242	2·3
1964-65 . . .	5,358	6·0	1,973	6·9	2,951	5·9	78,712	1·4
1965-66 . . .	6,057	N.A.	1,370	N.A.	2,502	N.A.	67,608	N.A.

Note—NSS estimates for the years 1957-58 to 1961-62 do not include summer season.

TABLE 1.3(a)—*NSS and official estimates of area, all India, 1957-58 to 1965-66.*

(000 acres)

year	rice		wheat		jowar		bajra	
	NSS	official	NSS	official	NSS	official	NSS	official
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1957-58	77,188	79,811	37,204	28,986	49,615	42,777	41,433	27,600
1958-59	86,648	81,971	39,207	31,178	60,323	44,381	37,428	28,240
1959-60	91,157	83,572	45,993	33,063	63,725	43,756	40,885	26,428
1960-61	98,525	84,333	45,638	31,941	60,973	45,498	39,330	28,341
1961-62	103,394	85,732	48,033	33,533	54,082	45,095	32,226	27,869
1962-63	91,437	86,325	42,701	33,748	52,425	44,531	30,511	26,688
1963-64	92,276	88,025	40,764	33,350	50,413	44,371	30,188	26,651
1964-65	89,865	89,859	44,332	33,261	52,642	44,326	34,002	28,976
1965-66	86,731	86,542	39,526	31,625	53,964	42,456	36,151	28,240

TABLE 1.3(a)—*NSS and official estimates of area, all India,* 1957-58 *to* 1965-66—contd.

(000 acres)

year	maize		ragi		barley		total (seven cereals)	
	NSS	official	NSS	official	NSS	official	NSS	official
(1)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
1957-58	11,138	10,080	5,625	5,970	11,214	7,584	2,33,417	2,02,808
1958-59	14,530	10,539	7,052	6,277	13,653	8,184	2,58,841	2,10,770
1959-60	15,337	10,734	6,710	6,222	14,212	8,347	2,78,019	2,12,122
1960-61	15,148	10,890	7,363	6,215	13,332	7,920	2,80,309	2,15,141
1961-62	14,940	11,137	6,661	6,205	14,044	8,184	2,73,380	2,17,755
1962-63	13,987	11,384	6,484	5,723	12,845	7,468	2,50,390	2,15,868
1963-64	13,564	11,327	7,158	5,931	11,258	6,857	2,45,621	2,16,512
1964-65	12,999	11,411	6,597	6,022	10,666	6,632	2,51,103	2,20,487
1965-66	14,942	11,572	6,787	5,431	9,216	6,304	2,47,317	2,12,170

Note:—

(1) NSS estimates relate to 'gross' area under the crop while the official estimates relate to the net area.
(2) NSS estimates for the years 1957-58 to 1961-62 do not include summer season.
(3) NSS estimates for the year 1965-66 are preliminary estimates.
(4) Official estimates for 1957-58 to 1961-62 are fully revised estimates; for 1962-63 to 1964-65 partially revised estimates; and for 1965-66, final estimates.

TABLE 1.3(b)—*Comparison of the NSS and official estimates of production, all India,* 1957-58 *to* 1965-66.

(000 tons)

Year	rice			wheat			jowar			bajra		
	NSS	official	difference%	NSS	official	difference%	NSS	official	difference%	NSS	official	difference%
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1957-58 . .	27,709	25,122	10·3	11,053	7,872	40·4	13,876	8,499	63·3	5,323	3,563	49·4
1958-59 . .	34,924	30,360	15·0	12,021	9,795	22·7	16,466	8,890	85·2	6,018	3,807	58·1
1959-60 .	35,600	31,176	14·2	13,764	10,161	35·4	15,532	8,443	84·0	5,640	3,438	64·0
1960-61 . .	41,608	34,028	22·3	15,623	10,823	44·3	15,393	9,659	59·4	4,479	3,231	38·6
1961-62 . .	42,166	35,100	20·1	15,440	11,881	30·0	9,264	7,902	17·2	3,893	3,587	8·5
1962-63 . .	33,985	31,410	8·2	12,897	10,658	21·0	10,717	9,469	13·2	3,766	3,831	(—)1·7
1963-64 . .	37,846	36,306	4·2	10,712	9,705	10·4	9,968	8,991	10·9	3,963	3,675	7·8
1964-65 . .	38,298	30,417	(—)0·3	14,755	12,096	22·0	11,175	9,595	16·5	4,202	4,384	(—)4·2
1965-66 . .	30,849	30,130	2·4	11,883	10,551	12·6	10,437	7,374	41·5	4,504	3,541	27·2

TABLE 1.3(b)—*Comparison of the NSS and official estimates of production, all India, 1957-58 to 1965-66*—contd.

(000 tons)

year	maize			ragi			barley			total (seven cereals)		
	NSS	official	difference%	NSS	official	difference%	NSS	official	difference%	NSS	official	difference%
(1)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
1957-58	5,266	3,100	69·9	2,183	1,768	23·5	2,654	2,256	17·6	68,064	52,180	30·4
1958-59	6,918	3,408	103·0	2,566	1,919	32·2	3,370	2,651	27·1	82,283	60,830	35·3
1959-60	6,962	4,009	73·6	2,693	1,955	37·7	3,671	2,674	37·3	83,862	61,856	35·6
1960-61	6,522	4,016	62·4	2,317	1,809	28·1	4,530	2,774	63·3	90,472	66,340	36·4
1961-62	6,034	4,244	42·2	2,284	1,998	14·3	3,771	3,100	21·6	82,852	67,812	22·2
1962-63	6,147	4,506	36·4	1,928	1,861	3·6	3,131	2,385	31·3	75,571	64,120	13·2
1963-64	5,648	4,481	26·0	1,860	1,931	(—) 3·7	2,244	2,005	11·9	72,242	67,094	7·7
1964-65	5,358	4,584	19·9	1,973	1,868	5·6	2,951	2,483	18·8	78,712	73,427	7·2
1965-66	6,057	4,459	32·8	1,376	1,284	7·2	2,502	2,248	11·3	67,608	59,687	13·3

Note—

(1) NSS estimates for the years 1957-58 to 1961-62 do not include summer season.

(2) official estimates for 1962-63, 1963-64 and 1964-65 are partially revised estimates and those for 1965-66 are final estimates.

(3) difference per cent = $\frac{\text{NSS—(official)} \times 100}{\text{official}}$

TABLE 1.3(c)—*Comparison of NSS estimates of allocated area with official estimates of area, all India,* 1957-58 *to* 1965-66

(000 acres)

year	rice			wheat			jowar			bajra		
	NSS	official	difference%	NSS	official	difference%	NSS	official	difference%	NSS	official	difference%
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1957-58 . .	74,907	79,811	(—)6·1	29,009	28,986	0·1	37,037	42,777	(—)13·4	27,588	27,600	..
1958-59 . .	84,679	81,971	3·3	29,900	31,178	(—)4·7	44,767	44,381	0·9	27,945	28,240	(—)1·0
1959-60 . .	88,066	83,572	5·4	35,519	33,063	7·4	47,470	43,756	8·5	29,829	26,428	12·9
1960-61 . .	95,791	84,333	13·6	34,957	31,941	9·4	43,271	45,498	(—)4·9	27,830	28,341	1·8
1961-62 . .	1,00,292	85,732	17·0	36,505	33,533	8·9	40,021	45,095	(—)11·2	22,880	27,869	(—)17·9
1962-63 . .	83,694	86,325	2·7	32,453	33,748	(—)3·8	38,795	44,531	(—)12·9	21,663	26,688	(—)18·8
1963-64 . .	89,508	88,025	1·7	30,981	33,350	(—)7·1	37,306	44,371	(—)15·9	21,433	26,651	(—)19·6
1964-65 . .	87,169	89,859	(—)3·0	33,692	33,261	1·3	38,955	44,326	(—)12·1	24,141	28,976	(—)16·7
1965-66 . .	84,129	86,542	(—)2·8	30,040	31,625	(—)5·9	39,933	42,456	(—)5·9	25,667	28,240	(—)9·1

TABLE 1.3(c)—*Comparison of NSS estimates of allocated area with official estimates of area, all India, 1957-58 to 1965-66*—contd.

(000 acres)

year	maize			ragi			barley			total (seven cereals)		
	NSS	official	difference%	NSS	official	difference%	NSS	official	difference%	NSS	official	difference%
(1)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
1957-58	9,789	10,080	(—)2·9	4,529	5,970	(—)24·1	6,797	7,584	(—)10·4	1,89,656	2,02,808	(—)6·5
1958-59	11,797	10,539	11·9	6,179	6,277	(—)1·6	7,941	8,184	(—) 3·0	2,13,208	2,10,770	1·2
1959-60	12,306	10,734	19·3	6,078	6,222	(—)2·3	8,185	8,347	(—) 1·9	2,27,953	2,12,122	7·5
1960-61	12,557	10,890	15·3	6,220	6,215	0·1	7,661	7,920	(—) 3·3	2,28,287	2,15,141	6·1
1961-62	12,400	11,137	11·3	5,728	6,205	(—)7·7	8,146	8,184	(—)0·5	2,25,972	2,17,755	3·8
1962-63	11,609	11,384	2·0	5,576	5,723	(—)2·6	7,450	7,468	(—)0·2	2,06,240	2,15,868	(—)4·5
1963-64	11,258	11,327	(—)0·6	6,156	5,931	3·8	6,530	6,857	(—)4·8	2,03,172	2,16,512	(—)6·2
1964-65	10,789	11,411	(—)5·4	5,673	6,022	(—)5·8	6,186	6,632	(—)6·7	2,06,605	2,20,487	(—)6·3
1965-66	12,402	11,572	7·2	5,837	5,431	7·5	5,345	6,304	(—)15·2	2,03,353	2,12,170	(—)4·2

Note—(1) NSS estimates for the years 1957-58 to 1961-62 do not include summer season.

(2) difference per cent= $\frac{\text{NSS—official}}{\text{official}} \times 100$

TABLE 1.4(a)—*Trends in NSS and official estimates of area (indices)*

(base : 1962-63=100)

year	rice		wheat		jowar		bajra		maize		ragi		barley		total (7 cereals)	
	NSS	officials	NSS	official	NSS	official	NSS	official	NSS	official	NSS	official	NSS	official	NSS	official
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
1957-58	84	92	87	86	95	96	136	103	80	89	87	104	87	102	93	94
1958-59	95	95	92	92	115	100	123	106	104	93	109	110	106	110	103	98
1959-60	100	97	108	98	122	98	134	99	110	94	103	109	111	112	111	98
1960-61	108	98	107	95	116	102	129	106	108	96	114	109	104	106	112	100
1961-62	113	99	112	99	103	101	106	104	107	98	103	108	109	110	109	101
1962-63	108	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
1963-64	101	102	95	99	96	100	99	100	97	99	110	104	88	92	98	100
1964-65	98	104	104	98	100	100	111	109	93	100	102	103	83	89	100	102
1965-66	95	100	99	94	103	95	118	106	107	109	105	95	72	84	99	98

Note—NSS estimates relates to 'gross' area and official estimates relate to 'net" area.

TABLE 1.4(b)—*Trends in NSS and official estimates of production (indices)*

(base : 1962-63 = 100)

year	rice		wheat		jowar		bajra		maize		ragi		barley		total (7 cereals)	
	NSS	official	NSS	official	NSS	official	NSS	official	NSS	official	NSS	official	NSS	official	NSS	official
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
1957-58	82	80	86	74	129	90	141	93	86	69	113	91	85	95	94	81
1958-59	103	97	93	92	154	94	160	99	113	76	133	103	108	111	113	95
1959-60	105	99	107	95	145	89	150	90	113	89	140	105	117	112	116	96
1960-61	122	108	121	101	144	102	119	84	106	89	120	97	145	116	125	103
1961-62	124	112	120	111	86	83	103	94	98	94	118	107	120	130	114	106
1962-63	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
1963-64	111	116	83	91	93	95	105	96	92	99	96	104	72	84	100	105
1964-65	113	122	114	113	104	101	112	114	87	102	102	100	94	104	108	114
1965-66	91	96	92	99	97	78	120	92	98	101	71	69	80	94	93	93

TABLE 1.4(c)—*Trends in NSS and official estimates of yield rate (indices)*

(base : 1962-63=100)

year	rice		wheat		jowar		bajra		maize		ragi		barley		total (7 cereals)	
	NSS	official	NSS	official	NSS	official	NSS	official	NSS	official	NSS	official	NSS	official	NSS	official
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
1957-58	97	87	98	86	137	94	83	90	107	78	114	88	97	93	100	87
1958-59	108	102	102	100	133	94	77	93	107	82	107	94	101	101	109	97
1959-60	105	102	99	97	119	91	83	91	102	95	118	96	106	100	104	98
1960-61	114	110	113	106	124	100	87	79	97	93	92	89	139	109	111	103
1961-62	110	113	106	112	84	82	92	90	91	96	101	99	110	118	109	105
1962-63	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
1963-64	110	104	87	92	96	95	100	96	94	100	78	100	81	91	101	105
1964-65	115	117	110	115	104	101	100	104	94	102	101	95	113	117	108	112
1965-66	96	96	100	105	95	82	101	87	92	99	68	73	111	112	94	95

Note—NSS estimates relate to "gross yield rate" and official estimates relate to "net yield rate".

TABLE 1.5—*Percentage of pure and allocated area to gross area (NSS series).*

year	percentage area under pure crop to gross area						
	rice	wheat	jowar	bajra	maize	ragi	barley
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1957-58	93·42	39·67	31·13	27·32	70·34	20·90	21·50
1958-59	94·10	34·86	28·31	27·62	52·17	52·95	16·19
1959-60	93·53	36·65	26·97	25·19	56·52	52·32	15·99
1960-61	93·61	34·49	24·79	31·77	54·50	42·67	14·57
1961-62	94·93	38·27	29·16	26·86	58·48	43·66	12·68
1962-63	93·64	34·35	25·69	24·65	53·32	41·97	15·9
1963-64	95·83	35·05	27·16	27·02	66·55	40·08	13·70
1964-65	95·82	34·63	23·82	22·25	45·98	39·08	12·83
1965-66	95·31	36·24	23·26	30·01	48·48	40·71	12·55

TABLE 1.5—*Percentage of pure and allocated area to gross area (NSS series)*—contd.

year	percentage allocated area to gross area						
	rice	wheat	jowar	bajra	maize	ragi	barley
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1957-58	97·04	77·97	74·65	66·58	87·89	80·52	60·61
1958-59	97·73	76·26	74·21	74·66	81·19	87·62	58·16
1959-60	96·61	77·23	74·49	72·96	83·50	90·58	57·69
1960-61	97·23	76·60	70·97	70·96	82·90	84·48	57·46

Note—NSS stopped giving "allocated" area after 1960-61.

TABLE 2.1—*Comparison of the NSS and official estimates of area by states, 1960-61 to 1965-66*

(000 acres)

state	1960-61			1961-62			1962-63			1963-64			1964-65			1965-66		
	NSS	range %	official	NSS	range %	official	NSS	range %	official	NSS	range %	official	NSS	range %	official	NSS	range %	official
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
								rice										
Andhra Pradesh	7,877	1·2	7,317	9,984	39·1	8,384	8,568	5·6	7,532	9,099	3·7	8,187	9,482	11·5	8,550	9,365	13·6	7,754
Assam	6,852	19·2	4,549	6,684	23·7	4,658	5,900	19·5	4,448	6,489	27·8	4,557	5,562	17·4	4,705	5,003	6·4	4,769
Bihar	15,018	92·0	12,949	15,315	17·2	12,580	14,175	6·3	12,842	15,506	10·0	13,129	13,994	7·6	13,121	14,523	5·6	12,968
Madhya Pradesh	12,274	15·6	10,230	15,716	16·8	10,364	11,981	26·5	10,527	10,317	0·7	10,514	10,848	16·9	10,683	10,585	9·8	10,188
Madras	8,944	17·3	6,222	8,462	15·6	6,272	7,958	32·6	6,341	6,949	2·3	6,472	6,430	10·2	6,519	6,994	10·7	6,034
Maharashtra	4,058	55·9	3,210	5,114	70·3	3,257	3,434	15·1	3,183	3,842	14·1	3,284	3,583	3·7	3,376	3,328	26·1	3,101
Uttar Pradesh	11,187	14·8	10,339	10,458	22·5	10,314	11,286	4·4	10,571	11,827	18·5	10,747	11,773	1·2	10,994	10,652	9·1	10,040
Kerala	2,208	3·8	1,925	1,594	38·3	1,861	1,674	7·8	1,982	1,875	10·0	1,989	1,745	9·6	1,979	1,742	19·6	1,977
Orissa	10,363	13·8	9,351	11,881	20·4	10,070	9,782	4·3	10,962	10,311	32·3	10,648	9,198	0·0	10,710	7,604	12·9	10,475
West Bengal	10,687	2·4	11,379	10,540	13·1	10,925	9,312	12·5	10,984	9,207	6·3	11,197	9,435	17·6	11,542	8,973	16·2	11,493
All-India	98,525	7·8	84,333	103,394	7·6	85,732	91,437	2·4	86,325	92,276	1·2	88,025	89,865	6·0	89,859	86,731	4·3	86,543

$$\text{range per cent} = \frac{\text{difference between the two half sample estimates}}{\text{combined estimate}} \times 100, \text{ except for 1961-62.}$$

NSS estimates relate to gross area.

TABLE 2.1—*Comparison of the NSS and official estimates of area by states,* 1960-61 *to* 1965-66—contd.

(000 acres)

State	1960-61			1961-62			1962-63			1963-64			1964-65			1965-66		
	NSS	range %	official	NSS	range %	official	NSS	range %	official	NSS	range %	official	NSS	range %	official	NSS	range %	official
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
								wheat										
Gujarat	813	30·5	885	1,626	102·9	1,040	1,378	20·0	1,006	1,568	25·8	1,028	878	10·1	1,097	1,138	10·4	1,325
Madhya Pradesh	10,337	2·4	7,641	9,879	31·8	7,851	9,258	14·5	8,109	8,210	8·8	8,224	9,550	5·3	7,806	7,906	4·9	6,343
Punjab	6,519	4·0	5,392	6,686	22·6	5,535	6,956	9·8	5,839	5,874	6·6	5,814	8,345	11·7	6,064	6,861	5·5	5,711
Uttar Pradesh	15,277	1·8	9,374	16,678	21·3	10,131	14,956	2·2	9,981	14,860	2·7	9,679	14,535	2·3	9,798	14,735	6·2	10,213
All-India	45,638	7·7	31,944	48,033	21·1	33,533	42,701	0·7	33,748	40,764	8·1	33,350	44,332	2·4	33,261	39,526	1·5	31,625
								jowar										
Andhra Pradesh	10,073	6·6	6,652	8,279	13·8	6,600	8,330	1·4	5,903	7,100	10·4	6,375	6,819	15·6	6,165	8,395	11·1	5,488
Gujarat	2,919	57·1	3,249	3,809	31·7	3,230	2,714	6·5	3,264	3,323	9·7	3,324	1,931	7·5	3,358	1,861	13·2	3,267
Madras	3,314	69·5	1,913	2,531	43·8	1,895	2,328	3·8	1,878	2,484	29·2	1,861	2,331	11·8	1,858	2,259	13·3	1,834
Maharashtra	18,811	14·3	15,528	16,078	17·5	15,207	18,044	8·0	15,126	16,148	8·4	15,024	19,069	11·6	14,918	18,579	1·8	14,856
All-India	60,973	15·4	45,498	54,082	2·8	45,095	52,425	0·8	44,532	50,413	6·3	44,371	52,642	6·9	44,326	53,964	5·9	42,456

range per cent = $\frac{\text{difference between two half sample estimates}}{\text{combined estimate}}$ × 100, except for 1961-62.

NSS estimates relate to gross area.

TABLE 2.1—*Comparison of NSS and official estimates of area by states,* 1960-61 *to* 1965-66—contd.

(000 acres)

State	1960-61			1961-62			1962-63			1963-64			1964-65			1965-66		
	NSS	range %	official	NSS	range %	official	NSS	range %	official	NSS	range %	official	NSS	range %	official	NSS	range %	official
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
								bajra										
Rajasthan . . .	14,195	25·9	11,263	9,617	31·0	10,851	10,533	29·9	10,285	11,038	3·6	10,683	11,613	1·9	11,992	13,932	20·2	11,879
All-India . . .	39,330	3·8	28,341	32,226	10·9	27,869	30,511	2·6	26,688	30,188	7·7	26,651	34,002	0·3	28,976	36,151	1·0	28,240
								maize										
Bihar	3,592	13·2	1,989	2,561	25·0	2.024	2.655	5·0	2,066	2,849	22·0	2,031	1,966	17·4	1,841	2,225	26·6	1,834
Jammu and Kashmir .	647	8·8	534	767	11·1	573	598	28·0	618	601	3·0	593	609	16·6	618	433	0·0	613
All-India . . .	15,148	5·4	10,890	14,940	12·4	11,137	13,987	14·6	11,384	13,564	20·7	11,327	12,999	15·1	11,411	14,942	3·0	11,572
								ragi										
Mysore	3,022	29·9	2,461	2,706	30·6	2,540	2,624	7·3	2,338	3,398	23·7	2,402	3,058	4·1	2,424	2,714	28·0	2,061
All-India . . .	7,363	9·4	6,215	6,661	21·4	6,205	6,484	4·1	5,723	7,158	6·7	5,931	6,597	11·0	6,022	6,787	10·3	5,431
								barley										
Uttar Pradesh . .	7,688	13·2	4,562	7,892	10·7	4,507	7,381	21·2	4,144	6,659	21·7	3,912	6,051	6·3	3,707	5,827	6·3	3,524
All-India . . .	13,332	12·7	7,920	14,044	6·1	8,184	12,845	22·8	7,468	11,258	2·6	6,857	10,666	4·5	6,632	9,216	3·2	6,304

$$\text{range per cent} = \frac{\text{difference between the two half sample estimates}}{\text{combined estimate}} \times 100, \text{ except for 1961-62.}$$

NSS estimates relate to gross area.

TABLE 2.2—*Comparison of the NSS and official estimates of production by states, 1960-61 to 1965-66*

(000 tons)

State	1960-61					1961-62					1962-63				
	NSS	range %	official	s.e. %	difference %	NSS	range %	official	s.e. %	difference %	NSS	range %	official	s.e. %	difference %
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
							rice								
Andhra Pradesh	4,369	19·9	3,603	N.A.	21·3	5,163	20·5	4,444	N.A.	16·2	3,845	1·8	3,446	N.A.	11·6
Assam	2,522	20·7	1,723	1·5	46·4	2,386	11·7	1,745	1·8	36·7	2,321	1·6	1,501	2·1	54·6
Bihar	5,792	13·5	4,473	N.A.	29·5	6,277	16·0	4,335	N.A.	44·8	4,929	7·6	4,213	N.A.	17·0
Madhya Pradesh	4,448	16·0	2,402	N.A.	85·2	5,594	24·0	3,434	N.A.	62·9	3,041	50·5	2,319	3·0	31·1
Madras	5,011	0·8	3,503	1·4	43·0	4,262	10·7	3,846	1·6	10·8	4,172	43·4	3,800	1·6	9·9
Maharashtra	1,436	72·7	1,348	N.A.	6·5	2,192	20·9	1,485	N.A.	47·6	1,426	9·9	1,081	N.A.	31·9
Uttar Pradesh	3,534	2·2	3,101	N.A.	14·0	3,202	29·3	3,291	N.A.	(—)2·7	3,600	25·8	3,085	N.A.	16·7
Kerala	1,037	10·2	1,051	N.A.	(—)1·3	777	31·5	988	N.A.	(—)21·4	750	5·9	1,076	N.A.	(—)30·3
Orissa	4,615	8 2	3,670	N.A.	25·7	4,465	10·5	3,664	N.A.	21·9	3,481	27·3	3,619	N.A.	(—)3·8
West Bengal	4,796	4·8	5,368	M.A.	(—)10·7	4,433	16·3	4,723	N.A.	(—)6·1	3,392	26·6	4,340	N.A.	(—)21·8
All-India	41,608	1·9	34,028	..	22·3	42,166	10·5	35,100	..	20·1	33,985	2·7	31,410	..	8·2

range per cent = $\frac{\text{difference between the two half sample estimates}}{\text{combined estimate}} \times 100$, except for 1961-62.

difference per cent = $\frac{\text{NSS—official}}{\text{official}} \times 100$

s.e. per cent relates to official estimates.

TABLE 2.2—*Comparison of the NSS and official estimates of production by states,* 1960-61 *to* 1965-66—contd.

(000 tons)

State	1963-64					1964-65					1965-66				
	NSS	range %	official	s.e. %	difference %	NSS	range %	official	s.e. %	difference %	NSS	range %	official	s.e. %	difference %
(1)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)
							rice								
Andhra Pradesh .	4,940	12·8	4,226	N.A.	16·9	5,281	11·2	4,815	N.A.	9·7	5,116	20·1	4,099	N.A.	24·8
Assam . .	2,972	30·0	1,820	3·6	63·3	2,632	13·7	1,881	N.A.	39·9	2,122	4·0	1,818	N.A.	16·7
Bihar . .	5,802	16·7	4,454	N.A.	30·3	5,557	10·6	4,838	N.A.	14·9	5,023	7·1	4,179	N.A.	20·2
Madhya Pradesh .	3,174	24·1	3,278	3·2	(—)3·2	3,422	19·2	3,430	N.A.	(—)0·2	1,747	22·6	1,619	N.A.	7·9
Madras . .	3,505	1·0	3,855	1·6	(—)9·1	3,373	15·9	3,984	N.A.	(—)15·3	3,111	6·6	3,650	N.A.	(—)14·8
Maharashtra. .	1,388	11·9	1,502	N.A.	(—)7·6	1,518	6·7	1,454	N.A.	4·4	1,033	16·8	849	N.A.	21·7
Uttar Pradesh .	3,470	16·3	3,226	N.A.	7·6	3,583	10·3	3,270	N.A.	9·6	2,399	30·7	2,232	N.A.	7·1
Kerala . .	944	21·1	1,111	N.A.	(—)15·0	912	5·1	1,103	N.A.	(—)17·3	893	29·8	990	N.A.	(—)9·8
Orissa . . .	4,581	49·0	4,241	1·0	8·0	3,639	3·7	4,351	N.A.	(—)16·4	2,783	12·3	3,202	N.A.	(—)13·1
West Bengal .	4,216	12·8	5,250	N.A.	(—)19·7	4,876	14·4	5,670	N.A.	(—)14·0	3,826	16·6	4,816	N.A.	(—)20·5
All-India . .	37,846	0·9	36,306	..	4·2	38,298	5·3	38,417	..	0·3	30,849	5·3	30,139	..	2·4

range per cent = $\frac{\text{difference between the two half sample estimates}}{\text{combined estimate}} \times 100$, except for 1961-62.

difference per cent = $\frac{\text{NSS—official}}{\text{official}} \times 100$

s.e. relates to official estimates.

TABLE 2.2—*Comparison of the NSS and official estimates of production by states*, 1960-61 *to* 1965-66—contd.

(000 tons)

State	1960-61					1961-62					1962-63				
	NSS	range %	official	s.e. %	difference %	NSS	range %	official	s.e. %	difference %	NSS	range %	official	s.e. %	difference %
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
						wheat									
Gujarat	390	14·4	267	N.A.	46·1	786	113·0	371	N.A.	111·9	562	11·2	298	3·9	88·6
Madhya Pradesh	3,360	6·2	1,921	N.A.	74·9	2,634	15·9	2,143	N.A.	22·9	2,613	13·5	2,120	2·0	23·2
Punjab	2,856	16·0	2,592	N.A.	10·2	2,924	14·0	2,720	N.A.	7·5	2,677	12·2	2,676	N.A.	..
Uttar Pradesh	5,138	5·3	3,882	N.A.	32·4	5,264	12·3	4,889	N.A.	7·7	4,217	6·7	3,160	N.A.	33·4
All-India	15,623	18·8	10,823	..	44·3	15,440	10·2	11,881	..	30·0	12,897	2·1	10,658	..	21·0
						jowar									
Andhra Pradesh	2,336	28·2	1,313	N.A.	77·9	1,525	31·3	1,424	N.A.	7·1	1,165	7·4	1,341	N.A.	(—)13·1
Gujarat	718	60·7	218	N.A.	229·4	555	18·0	316	N.A.	75·6	492	37·6	442	4·9	11·3
Madras	669	79·8	538	N.A.	24·3	372	76·9	590	N.A.	(—)36·9	492	3·2	593	N.A.	(—)17·0
Maharashtra	5,739	38·1	4,157	N.A.	38·1	3,145	35·5	2,920	N.A.	7·7	4,184	25·9	3,219	N.A.	30·0
All-India	15,393	25·3	9,659	..	59·4	9,264	18·8	7,902	..	17·2	10,717	11·7	9,469	..	13·2

$$\text{range per cent} = \frac{\text{difference between the two half sample estimates}}{\text{combined estimate}} \times 100, \text{ except for 1961-62.}$$

$$\text{difference per cent} = \frac{\text{NSS—official}}{\text{official}} \times 100$$

s.e. per cent relates to official estimates.

TABLE 2.2—*Comparison of the NSS and official estimates of production by states, 1960-61 to 1965-66—contd.*

(000 tons)

state	1963-64					1964-65					1965-66				
	NSS	range %	official	s.e. %	difference %	NSS	range %	official	s.e. %	difference %	NSS	range %	official	s.e. %	difference %
(1)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)
							wheat								
Gujarat . .	785	16·4	361	2·8	117·5	488	3·4	418	2·9	16·7	682	12·4	570	N.A.	19·6
Madhya Pradesh .	2,105	4·3	1,889	1·9	11·4	2,305	1·2	1,950	2·0	18·2	1,738	1·6	1,402	N.A.	24·0
Punjab . .	2,131	7·8	2,789	N.A.	(—)23·6	3,827	12·7	3,399	N.A	12·6	2,677	1·8	2,707	N.A.	(—)1·1
Uttar Pradesh .	3,167	5·4	2,672	N.A.	18·5	5,228	12·2	4,053	N.A.	29·0	4,347	3·4	4,122	N.A.	5·4
All-India . .	10,712	2·2	9,705	..	14·4	14,755	4·1	12,096	..	22·0	11,883	6·6	10,551	M.A	12·6
							Jowar								
Andhra Pradesh .	1,027	1·5	1,361	N.A.	(—)24·5	847	25·9	1,188	N.A.	—28·7	1,784	53·2	1,045	N.A.	70·7
Gujarat . .	479	76·6	403	4·5	18·9	470	59·0	420	4·2	11·9	597	32·1	332	N.A.	80·4
Madras . .	443	5·6	573	N.A.	(—)22·7	459	2·1	529	5·2	(—)13·2	397	0·5	493	N.A.	(—)19·5
Maharashra . .	3,834	3·6	3,170	N.A.	20·9	4,883	30·5	3,249	N.A.	50·3	3,918	6·4	2,288	N.A.	71·2
All-India . .	9,968	14·2	8,991	..	10·9	11,175	0·8	9,595	..	16·5	10,437	0·8	7,374	..	41·5

$$\text{range per cent} = \frac{\text{difference between the two half sample estimates}}{\text{combined estimate}} \times 100$$

$$\text{difference per cent} = \frac{\text{NSS—official}}{\text{official}} \times 100$$

s.e. per cent relates to official estimates.

TABLE 2.2—*Comparison of the NSS and official estimates of production by states,* 1960-61 *to* 1965-66—contd.

(000 tons)

state	1960-61					1961-62					1962-63				
	NSS	range %	official	s.e. %	difference %	NSS	range %	official	s.e. %	difference %	NSS	range	official	s.e. %	difference %
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
						bajra									
Rajasthan . .	1,206	8·0	721	N.A.	67·3	788	24·2	1,056	4·0	(—)25·4	994	42·5	941	3·7	5·6
All-India . .	4,479	12·9	3,231	..	38·6	3,893	10·5	3,587	..	8·5	3,766	31·8	3,831	..	(—)1·7
						maize									
Bihar . .	1,430	38·9	808	3·0	77·6	1,360	29·1	825	N.A.	64·8	1,300	10·4	871	N.A.	49·2
Jammu and Kashmir	404	41·3	199	..	103·0	466	31·8	215	..	116·7	433	43·6	241	..	79·7
All-India . .	6,522	19·1	4,016	..	62·4	6,034	11·9	4,244	..	42·2	6,147	8·4	4,506	..	36·4
						ragi									
Mysore . .	727	74·6	742	N.A.	(—)2·0	778	64·5	821	5·1	(—)5·2	640	14·2	778	4·0	(—)17·7
All India . .	2,317	43·2	1,809	..	28·1	2,284	33·6	1,998	..	14·3	1,928	19·9	1,861	..	3·6
						barley									
Uttar Pradesh .	1,877	57·2	1,661	N.A.	13·0	1,973	3·1	1,727	N.A.	14·2	1,423	0·4	1,312	N.A.	8·5
All-India . .	4,530	46·4	2,774	..	63·3	3,771	8·2	3,100	..	21·6	3,131	2·9	2,385	..	31·3

$$\text{range per cent} = \frac{\text{difference between the two half sample estimates}}{\text{combined estimate}} \times 100, \text{ except for 1961-62.}$$

$$\text{difference per cent} = \frac{\text{NSS} - \text{official}}{\text{official}} \times 100$$

s.e. per cent relates to official estimates.

TABLE 2.2—*Comparison of the NSS and official estimates of production by states,* 1960-61 *to* 1965-66—contd.

(000 tons)

state	1963-64					1964-65					1965-66				
	NSS	range %	official	s.e. %	difference %	NSS	range %	official	s.e. %	difference %	NSS	range %	official	s.e. %	difference %
(1)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)
							bajra								
Rajasthan . .	858	74·0	808	5·2	6·2	751	3·3	1,251	3·7	(—)40·0	823	42·1	917	N.A.	(—)10·2
All-India . .	3,963	27·0	3,675	..	7·8	4,202	21·9	4,384	..	(—)4·2	4,504	11·6	3,541	N.A.	27·2
							maize								
Bihar . .	1,233	19·3	879	N.A.	40·3	570	24·7	575	N.A.	(—)0·9	816	26·3	667	N.A.	22·3
Jammu and Kashmir	395	30·9	187	..	111·2	348	5·9	212	..	64·2	115	0·0	156	N.A.	(—)26·8
All-India . .	5,648	3·5	4,481	..	26·0	5,358	22·9	4,584	..	16·9	6,057	13·9	4,559	N.A.	32·8
							ragi								
Mysore . .	678	13·9	812	4·0	(—)16·5	768	10·5	723	3·0	6·2	251	43·9	382	N.A.	(—)34·3
All-India	1,860	3·7	1,931	..	(—)3·7	1,973	6·4	1,868	..	5·6	1,376	3·1	1,284	N.A.	7·2
							barley								
Uttar Pradesh .	1,252	17·9	1,090	N.A.	14·9	1,684	8·8	1,446	N.A.	16·5	1,385	13·2	1,251	N.A.	10·7
All-India . .	2,244	1·4	2,005	..	11·9	2,951	16·4	2,483	..	18·8	2,502	8·1	2,248	N.A.	11·3

$$\text{range per cent} = \frac{\text{difference between the two half sample estimates}}{\text{combined estimate}} \times 100$$

$$\text{difference per cent} = \frac{\text{NSS—official}}{\text{official}} \times 100$$

s.e. per cent relates to official estimates.

TABLE 2.3—*Comparison of NSS and official estimates of production by states, all cereals,* 1957-58 *to* 1965-66.

(000 tons)

state	1957-58			1958-59			1959-60			1960-61		
	NSS	official	diffce%	NSS	official	diffce %	NSS	official	diffce %	NSS	official	diffce %
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1. Andhra Pradesh	6,792	5,224	30·0	7,735	5,943	30·2	8,482	5,975	42·0	7,453	5,598	33·1
2. Assam .	1,769	1,623	9·0	1,452	1,628	(—)10·8	1,847	1,625	13·7	2,538	1,733	46·5
3. Bihar . .	5,211	3,164	64·7	6,992	5,667	23·4	7,570	5,605	35·1	8,650	6,026	43·5
4. Gujarat .	..	..	..	..	..	..	2,791	1,516	84·1	2,973	1,574	88·9
5. Jammu and Kashmir .	1,060	350	202·9	1,283	527	143·5	1,281	512	150·2	903	601	50·2
6. Kerala .	898	919	(—)2·3	1,026	948	8·2	839	1,031	(—)18·6	1,040	1,057	(—)1·6
7. Madhya Pradesh .	5,281	4,960	6·5	9,149	7,187	27·3	8,241	7,136	15·5	10,777	7,598	41·8
8. Madras .	4,437	4,389	1·1	5,642	4,275	32·0	5,402	4,590	17·7	6,361	4,701	35·3
9. Maharashtra .	12,072*	6,673*	80·9	13,531*	7,772*	74·1	9,451	5,094	85·5	8,225	6,571	25·2
10. Mysore .	4,456	3,224	38·2	4,332	3,361	28·9	4,354	3,519	23·7	5,249	3,399	54·4
11. Orissa .	2,934	1,744	68·2	5,399	2,207	144·6	5,183	3,705	39·9	4,748	3,716	27·8
12. Punjab .	4,866	3,498	39·1	4,156†	4,011†	3·6	5,534†	4,154†	33·2	4,947	4,132	19·7
13. Rajasthan .	3,491	3,234	7·9	5,248	3,555	47·6	5,377	3,552	51·4	6,126	3,250	88·5
14. Uttar Pradesh	9,825	8,292	18·5	13,184	9,300	41·8	13,301	9,421	41·2	14,316	10,256	39·6
15. West Bengal .	3,985	4,387	(—)9·2	3,447	4,153	(—)17·0	4,209	4,283	(—)1·7	4,874	5,452	(—)10·6
All-India .	68,064	52,180	30·4	82,283	60,830	35·3	83,862	61,856	35·6	90,472	66,340	36·4

* relates to former Bombay State.
† includes Delhi & Himachal Pradesh also.

$$\text{difference per cent} = \frac{\text{NSS—official}}{\text{official}} \times 100$$

L J(D)192PC—6

TABLE 2.3—*Comparison of NSS and official estimates of production by states, all cereals,* 1957-58 *to* 1965-66—contd.

(000 tons)

State	1961-62			1962-63			1963-64			1964-65			1965-66		
	NSS	official	difference %	NSS	official	difference %	NSS	official	difference %	NSS	official	difference %	NSS	official	difference %
(1)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)
1. Andhra Pradesh	7,779	6,781	14·7	5,878	5,545	6·0	6,732	6,351	6·0	7,246	6,814	6·3	7,814	5,715	36·7
2. Assam . .	2,397	1,755	36·6	2,410	1,512	59·4	2,991	1,833	63·2	2,647	1,896	39·6	2,319	1,834	16·6
3. Bihar . .	9,006	6,038	49·2	7,345	5,949	23·4	7,813	6,069	28·7	7,139	6,114	16·8	6,764	5,552	21·8
4. Gujarat .	2,751	2,090	30·7	2,361	1,942	21·6	2,730	2,173	25·6	3,055	2,425	26·0	3,139	2,062	52·2
5. Jammu and Kashmir .	1,006	574	75·2	966	615	57·1	990	582	70·1	956	521	83·5	543	408	33·1
6. Kerala .	779	993	(—)21·6	761	1,080	(—)29·5	948	1,116	(—)15·0	913	1,112	(—)17·9	893	998	(—)10·5
7. Madhya Pradesh .	10,048	7,158	40·4	7,968	6,662	19·6	7,535	7,314	3·0	8,439	7,919	6·6	6,016	4,984	20·7
8. Madras . .	5,303	5,077	4·5	5,150	5,034	2·3	4,421	5,073	(—)12·9	4,226	5,179	(—)18·4	3,964	4,678	(—)15·3
9. Maharashtra .	6,736	5,435	23·9	6,815	5,466	24·7	6,450	5,639	14·4	7,699	5,774	33·3	6,057	3,901	55·3
10. Mysore .	4,770	3,526	35·3	3,939	3,672	7·3	3,857	3,792	1·7	3,991	4,033	(—)1·0	2,813	2,875	(—)2·2
11. Orissa . .	4,573	3,720	22·9	3,609	3,670	(—)1·7	4,683	4,310	8·7	3,776	4,415	(—)14·5	2,960	3,297	(—)10·2
12. Punjab .	4,960	4,420	12·2	4,088	4,164	(—)1·8	3,580	4,571	(—)21·7	5,440	5,418	0·4	4,879	4,660	4·7
13. Rajasthan .	4,791	4,055	18·2	4,818	3,795	27·0	4,070	3,113	30·7	4,053	4,068	(—)0·4	3,733	3,053	22·3
14. Uttar Pradesh .	12,249	10,606	15·5	12,019	9,869	21·8	10,517	8,895	18·2	13,070	11,066	21·7	10,627	9,869	7·7
15. West Bengal .	4,535	4,833	(—)6·2	3,438	4,438	(—)22·5	4,276	5,346	(—)20·0	4,968	5,758	(—)13·7	3,915	4,926	(—)20·5
All-India .	82,852	67,812	22·2	72,571	64,120	13·2	72,242	67,094	7·7	78,712	73,427	7·2	67,608	59,687	13·3

$$\text{difference per cent} = \frac{\text{NSS—official}}{\text{official}} \times 100$$

TABLE 2.4—*Comparison of NSS and official estimates of area, yield rate and production of rice crop by states, 1960-61 to 1965-66*

state	agency	1960-61			1961 62			1962-63		
		a	y	p	a	y	p	a	y	p
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Andhra Pradesh . . .	NSS	7,877	1,242	4,369	9,984	1,158	5,163	8,568	1,005	3,845
	official	7,317	1,103	3,603	9,384	1,187	4,444	7,532	1,025	3,446
Assam	NSS	6,852	824	2,522	6,684	800	2,386	5,900	881	2,321
	official	4,549	849	1,723	4,658	839	1,745	4,448	756	1,501
Bihar	NSS	15,018	864	5,792	15,315	918	6,277	14,175	779	4,929
	official	12,949	774	4,473	12,580	772	4,335	12,842	735	4,213
Madhya Pradesh . . .	NSS	12,274	812	4,448	15,716	797	5,594	11,981	569	3,041
	official	10,230	745	3,402	10,364	742	3,434	10,527	493	2,319
Madras	NSS	8,944	1,255	5,011	8,462	1,128	4,262	7,958	1,174	4,172
	official	6,222	1,261	3,503	6,272	1,374	3,846	6,341	1,342	3,800
Maharashtra . . .	NSS	4,058	793	1,436	5,114	960	2,192	3,434	930	1,426
	official	3,120	968	1,348	3,257	1,021	1,485	3,183	761	1,081
Uttar Pradesh . . .	NSS	11,187	708	3,534	10,458	686	3,202	11,286	750	3,600
	official	10,339	672	3,101	10,314	715	3,291	10,571	654	6,085
Kerala	NSS	2,208	1,052	1,037	1,594	1,092	777	1,674	1,004	750
	official	1,925	1,223	1,051	1,861	1,189	988	1,982	1,216	1,076
Orissa	NSS	10,363	998	4,615	11,881	842	4,465	9,782	797	3,481
	official	9,351	879	3,670	10,070	815	3,664	10,962	739	3,619
West Bengal . . .	NSS	10,687	1,005	4,796	10,540	942	4,433	9,312	816	3,392
	official	11,379	1,057	5,368	10,925	968	4,723	10,984	885	4,340
All-India	NSS	68,525	946	41,608	103,394	914	42,166	91,437	833	33,985
	official	84,333	904	34,028	85,732	917	35,100	86,325	815	31,410

Note—1. NSS estimates of area relate to gross area and yield rate to gross yield rate.

2. a—area in 000 acres; y—yield rate in lbs per acre; p—production in 000 tons.

TABLE 2.4—*Comparison of NSS and official estimates of area, yield rate and production of rice crop by states, 1960-61 to 1965-66*—contd.

state	agency	1963-64			1964-65			1965-66		
		a	y	p	a	y	p	a	y	p
(1)	(2)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
Andhra Pradesh	NSS	9,099	1,216	4,940	9,482	1,248	5,281	9,365	1,224	5,116
	official	8,187	1,156	4,226	8,550	1,261	4,815	7,754	1,184	4,099
Assam	NSS	6,489	1,026	2,972	5,562	1,060	2,632	5,003	950	2,122
	official	4,557	895	1,820	4,705	896	1,881	4,769	854	1,818
Bihar	NSS	15,506	838	5,802	13,994	890	5,557	14,523	775	5,023
	official	13,129	760	4,454	13,121	826	4,838	12,968	722	4,179
Madhya Pradesh	NSS	10,317	689	3,174	10,848	707	3,422	10,585	370	1,747
	official	10,514	698	3,278	10,683	719	3,430	10,188	356	1,619
Madras	NSS	6,949	1,130	3,505	6,430	1,175	3,373	6,994	997	3,111
	official	6,472	1,334	3,855	6,519	1,369	3,984	6,304	1,297	3,650
Maharashtra	NSS	3,842	809	1,388	3,583	949	1,518	3,328	695	1,033
	official	3,284	1,016	1,502	3,376	965	1,454	3,101	613	849
Uttar Pradesh	NSS	11,827	657	3,470	11,773	682	3,583	10,652	502	2,390
	official	10,747	672	3,226	10,994	666	3,270	10,040	498	2,232
Kerala	NSS	1,875	1,128	944	1,745	1,171	912	1,742	1,148	893
	official	1,989	1,251	1,111	1,979	1,248	1,103	1,977	1,122	990
Orissa	NSS	10,311	995	4,581	9,198	886	3,639	7,604	820	2,783
	official	10,648	892	4,241	10,710	910	4,351	10,475	685	3,202
West Bengal	NSS	9,207	1,026	4,216	9,435	1,158	4,876	8,973	955	3,826
	official	11,197	1,050	5,250	11,542	1,105	5,670	11,493	939	4,816
All-India	NSS	92,276	919	37,846	89,865	955	38,298	86,731	797	30,849
	official	88,025	724	36,306	89,859	958	38,417	86,543	780	30,130

Note—1. NSS estimates of area relate to gross area and yield rate to gross yield rate.
2. a—area in 000 acres; y—yield rate in lbs per acre; p—production in 000 tons.

TABLE 3.1—*Official estimates of gross area under some major crops in Madhya Pradesh*

(in acres)

year	wheat	jowar
(1)	(2)	(3)
1957-58	7,023,977*	5,090,346‡
1958-59	7,753,349*	5,057,456‡
1959-60	8,649,351†	4,769,803‡
1960-61	8,523,415†	5,569,417§
1961-62	8,788,005†	5,155,576§
1962-63	8,887,794†	5,450,463§
1963-64	9,148,242†	5,259,744§

*consists of net area under wheat obtained from pure wheat and wheat mixture + gram area under wheat-gram mixture.

†consists of net area under wheat obtained from pure wheat and wheat mixture + gram area under wheat-gram mixture + linseed area under wheat-linseed mixture.

‡consists of net area under jowar obtained from pure jowar mixture + tur area under jowar mixture.

§consists of net area under jowar obtained from pure jowar and jowar mixture + tur area under jowar-tur mixture + mung area under jowar-mung mixture.

TABLE 3.2—*Official estimates of gross area under some major crops in Punjab*

(in acres)

year	wheat*	jowar†	bajra‡	barley§	maize‖
(1)	(2)	(3)	(4)	(5)	(6)
1957-58 .	4,970,278	725,922	2,890,688	1,121,694	1,158,373
1958-59 .	7,017,763	760,773	2,450,329	997,131	1,249,652
1959-60 .	6,724,426	696,027	2,193,682	914,842	1,325,060
1960-61 .	6,476,466	793,444	2,366,317	802,157	1,351,904
1961-62 .	6,759,039	776,079	2,192,488	883,371	1,314,598

*consists of net area under wheat obtained from pure wheat and wheat mixtures + gram area under wheat-gram mixture + gram area and barley area under wheat gram-barley mixture + gram area and sarshaf area under gram sarshaf-wheat mixture + sarshaf area under wheat-sarshaf mixture + barley area under barley-wheat mixture.

†consists of net area under jowar obtained from pure jowar and jowar mixture + bajra area under jowar-bajra mixture + moth area, mung area and mash area under jowar-moth-mung-mash mixture + guara area under jowar-guara mixture.

‡consists of net area under bajra obtained from pure bajra and bajra mixtures + jowar area under bajra-jowar mixture + moth area, mung area and mash area under bajra moth-mung-mash mixture + moth area and mung area under bajra-moth-mung mixture + mash rarea under bajra-mash mixture.

§consists of net area under barley obtained from pure barley and barley mixture + wheat area, gram area and masar area under barley-wheat-gram massar mixture + gram area under gram-barley mixture + massar area under barley massar mixture + wheat area under barley-wheat mixture.

‖consists of net area under maize obtained from pure maize and maize-mixtures + mash area under maize-mash mixture.

TABLE 4.1—*Instances of opposite trends in annual changes in the NSS and official estimates of area*

(All-India)

(000 acres)

year	change from preceding year				weather conditions as per State season and crop reports and crop forecasts
	NSS (gross)		official (net)		
	extent	%	extent	%	
(1)	(2)	(3)	(4)	(5)	(6)
			total 7 cereals		
1961-62	—6,929	—2·47	+2,614	+1·21	More regions had normal rainfall in all the four seasons in 1961-62 compared to 1960-61.
1963-64	—4,769	—1·90	+644	+0·30	More regions had normal rainfall in all the four seasons in 1963-64 compared to 1962-63.
			rice		
1962-63	—11,957	—11·56	+593	+0·69	Comparatively better seasonal conditions at the time of sowing.
1964-65	—2,411	—2·61	+1,834	+2·08	The increase was accounted for mainly by West Bengal, Uttar Pradesh, Assam and Madhya Pradesh and was attributed to favourable weather. In comparison to 1963-64, more regions in the country had normal or above normal rainfall during the sowing period of the crop.
			wheat		
1962-63	—5,332	—11·10	+215	+0·64	The increase was contributed by Maharashtra, Punjab, Bihar and Gujarat. The preceding year was characterised by excessive rainfall in a number of States. The current year had normal rainfall in more States particularly during the monsoon months.
1964-65	+3,568	+8·75	—89	—0·27	The weather conditions were normal during the sowing period.
			jowar		
1960-61	—2,752	—4·32	+1,742	+3·98	Increase in Madhya Pradesh, Maharashtra and Punjab as a result of favourable weather conditions at the time of sowing.
1965-66	+1,332	+2·51	—1,870	—4·22	Decline in all the major jowar growing States due to lack of rain at the time of sowing.
			bajra		
1958-59	—4,005	—9·67	+640	+2·32	Increase was shared mainly by Rajasthan, Bombay, Punjab and Andhra Pradesh generally due to favourable weather conditions at the time of sowing.

TABLE 4.1—*Instances of opposite trends in annual changes in the NSS and official estimates of area*—contd.

(All-India)

(000 acres)

year	change from preceding year				weather conditions as per State season and crop reports and crop forecasts
	NSS (gross)		official (net)		
	extent	%	extent	%	
(1)	(2)	(3)	(4)	(5)	(6)
			bajra		
1959-60	+3,457	+9 24	—1,812	—6·42	As a result of unfavourable season at the time of sowing, acreage under the crop showed decrease in Bombay State, Punjab and Rajasthan.
1960-61	—1,555	—3·80	+1,913	+7·24	Increase mainly in Rajasthan, Punjab, Madhya Pradesh and Maharashtra owing to favourable weather conditions at the time of sowing.
1965-66	+2,149	+6·32	—763	—2·54	The decline was attributed to late and inadequate rain at the sowing time of the crop.
			maize		
1961-62	—208	—1·37	+247	+2·27	Increase generally due to favourable weather conditions at the time of sowing in almost all the major maize growing States.
1962-63	—953	—6·38	+247	+2·22	Increase was accounted for mainly by major Punjab, Jammu and Kashmir, Rajasthan and Bihar which had favourable weather conditions at the time of sowing.
1964-65	—565	—4·16	+84	+0·74	Increase was accounted for mainly by Uttar Pradesh, Rajasthan and Gujarat and was attributed to favourable climatic conditions at the time of sowing.
			ragi		
1960-61	+653	+9·73	—7	—0·11	Decrease was attributed to late and insufficient rainfall at the time of sowing in Andhra Pradesh and unfavourable weather conditions in other States, *viz.*, Gujarat, Maharashtra and Mysore.
1964-65	—561	—7·84	+91	1·53	Increase was accounted for mainly by Uttar Pradesh and Bihar and was attributed to favourable weather conditions at the time of sowing.
1965-66	+190	+2·88	—591	—9·81	Decline in area under ragi was accounted for mainly by Mysore, Andhra Pradesh and Uttar Pradesh and was attributed to lack of sufficient rain at the time of sowing.

TABLE 4.1(a)—*Instances of opposite trends in annual changes in the NSS and official estimates of area for particular States and crops*

(000 acres)

year	change from preceding year				weather conditions as per State season and crop reports and crop forecasts
	NSS (gross)		official (net)		
	extent	%	extent	%	
(1)	(2)	(3)	(4)	(5)	(6)
			Andhra Pradesh—jowar		
1965-66	+1,576	+23·11	—6,777	—10·98	There was inadequate rainfall at the sowing time of the crop.
			Bihar—maize		
1961-62	—1,031	—28·70	+35	+1·76	The weather conditions at the time of sowing of the crop were favourable.
1965-66	+259	+13·17	—7	—0·38	Weather conditions during the sowing period of maize in 1965-66 were not better than those prevailing during 1964-65.
			Maharashtra—jowar		
1964-65	+2,921	+18·09	—106	—0·71	Weather conditions at sowing time during this and the preceding year were more or less similar.
			Mysore—ragi		
1964-65	—340	—10·00	+22	+0·92	Weather conditions prevailing during the current and the preceding year were similar.
			Rajasthan—bajra		
1962-63	+916	+9·52	—566	—5·22	There was inadequate and unevenly distributed rainfall at the time of sowing.
1965-66	+2,319	+19·97	—113	—0·94	There was inadequate rain at the time of sowing.

TABLE 4.2—*Instances of opposite trends in annual changes in the NSS and official estimates of production*

(All-India)

(000 tons)

year	change from preceding year				weather conditions as per State season and crop reports and crop forecasts
	NSS		official		
	extent	%	extent	%	
(1)	(2)	(3)	(4)	(5)	(6)
			total 7 cereals		
1961-62	—7,620	—8·42	+1,472	+2·22	More regions had normal rainfall in all the seasons in 1961-62 compared to 1960-61.
1963-64	—329	—0·45	+2,974	+4·64	More regions had normal rainfall in all the seasons in 1963-64 compared to 1962-63.
			wheat		
1961-62	—183	—1·17	+1,058	+9·77	More regions in the country had normal rainfall during October-December and March-May in 1961-62 than in 1960-61. The monsoon rainfall during June-September was also more favourable in 1961-62 than in 1960-61.
			bajra		
1961-62	—586	—13·08	+356	+11·02	Due to generally favourable weather conditions for the growth of the crop during the current year, the production increased.
1963-64	+197	+5·23	—156	—4·07	The decrease in production had been reported mainly by Rajasthan, Maharashtra and Uttar Pradesh. In Rajasthan and Maharashtra, it was attributed to deficient rains and in Uttar Pradesh to damage caused by flood, drought etc.
1965-66	+302	+7·19	—848	—19·23	Inadequate rains at the time of the growth of the crop.
			maize		
1960-61	—440	—6·32	+7	0·17	Favourable climatic conditions during the period of growth of the crop especially in Madhya Pradesh, Gujarat, Rajasthan and Andhra Pradesh, resulted in increase in the production.
1961-62	—488	—7·48	+228	+5·68	Increase was partly due to increase in area under the crop and partly due to the favourable weather conditions for the growth of the crop.

TABLE 4.2—*Instances of opposite trends in annual changes in the NSS and official estimates of production*—contd.

(All-India)

(000 tons)

year	change from preceding year				weather conditions as per State season and crop reports and crop forecasts
	NSS		official		
	extent	%	extent	%	
(1)	(2)	(3)	(4)	(5)	(6)
			maize		
1964-65	—290	—5·13	+103	+2·30	Favourable weather conditions during the period of growth of the crop in most States.
			ragi		
1961-62	—33	—1·42	+189	+10·45	Favourable seasonal conditions in ragi growing States.
1963-64	—68	—3·53	+70	+3·76	Favourable seasonal conditions for the growth of the crop particuarly in Bihar.
1964-65	+113	+6·07	—63	—3·26	Decline in Mysore and Andhra Pradesh due to excessive rainfall during the growth period of the crop.
			barley		
1961-62	—759	—16·75	+326	+11·75	Increase was reported by almos all the major barley growing States as a result of favourable seasonal conditions both during the sowing and growing periods of the crop.

TABLE 4.2(a)—*Instances of opposite trends in annual changes in the NSS and official estimates of production for particular States and crops.*

(000 tons)

year	change from preceding year				weather conditions as per State season and crop reports and crop forecasts
	NSS		official		
	extent	%	extent	%	
(1)	(2)	(3)	(4)	(5)	(6)
			Andhra Pradesh—jowar		
1965-66	+937	+110·63	—143	—12·04	Inadequate rains at the sowing time and prolonged drought during the growth period of the crop resulted in fall in production.
			Bihar—maize		
1961-62	—70	—4·89	+17	+2·10	Increase in production was partly attributed to increase in acreage and partly to favourable weather conditions during the period of growth especially in Patna, Shahabad, Champaran, Muzaffarpur and Dharbhanga districts.
1962-63	—60	—4·41	+46	5·58	Increase was partly attributed to increase in acreage and partly to the favourable weather conditions during the growth period of the crop.
1963-64	—67	—5·15	+8	+0·92	Favourable weather conditions for the growth of the crop led to slight increase.
			Rajasthan—bajra		
1961-62	—418	—34·66	+335	+46·46	Weather and crop conditions prevailing during 1961-62 were reported to be much better than those in 1960-61.
1962-63	+206	+26·14	—115	—10·89	Decrease was due to shrinkage in the acreage.
1965-66	+72	+9·59	—334	—26·70	Decrease was partly attributed to shrinkage in area and partly due to inadequate rain during the growth period of the crop.

TABLE 4.3—*Instances of large annual changes in the same direction in the NSS and official estimates of area.*

(All-India)

(000 acres)

year	change from the preceding year				weather conditions as per State season and crop reports and crop forecasts
	NSS (gross)		official (net)		
	extent	%	extent	%	
(1)	(2)	(3)	(4)	(5)	(6)
			total 7 Cereals		
1958-59	+25,424	10·89	+7,962	3·92	The crops had to recover from the adverse effect of severe wide spread drought in the preceding year; and sharp rise was improbable.
1959-60	+19,178	+7·41	+1,352	+0·64	Weather conditions were not better than in the preceding year, as lesser number of regions had normal rain fall and larger number of regions had deficit rainfall.
1962-63	—22,990	—8·41	—1,887	—0·87	Weather conditions were more or less similar and large variation was not expected.
			rice		
1958-59	+9,460	+12·25	+2,160	+2·71	The crops had to recover from the adverse effect of severe widespread drought in the preceding year; and sharp rise was improbable.
			wheat		
1959-60	+6,786	+17·31	+1,885	+6·05	Large decreases in Punjab and Jammu and Kashmir due to adverse weather conditions offset increase in some other wheat growing States.
1965-66	—4,806	—10·84	—1,636	—4·92	Favourable weather during the sowing season and Rabi Campaign in Uttar Pradesn, Gujarat and Bihar offset considerable decline in other wheat growing States.
			jowar		
1958-59	+10,708	+21·58	+1,604	+3·75	Decrease in Andhra Pradesh and Madhya Pradesh as a result of adverse seasonal conditions at the sowing time offset the increases in the other major jowar growing States.
1961-62	—6,891	—11·30	—403	—0·89	The weather at the sowing time was favourable in half of the jowar growing States and unfavourable in the other half; and therefore, much variation was expected.

TABLE 4.3—*Instances of large annual changes in the same direction in the NSS and official estimates of area*—contd.

(All-India)

(000 acres)

year	change from the preceding year				weather conditions as per State season and crop reports and crop forecasts
	NSS (gross)		official (net)		
	extent	%	extent	%	
(1)	(2)	(3)	(4)	(5)	(6)
			bajra		
1961-62	—7,104	—18·06	—472	—1·67	The effect of adverse weather conditions in Gujarat, Punjab, Rajasthan and Uttar Pradesh was almost offset by favourable seasonal conditions in Andhra Pradesh and Maharashtra.
			maize		
1958-59	+3,392	+30·45	+459	+4·55	Sharp recovery from the adverse effect of drought in 1957-58 was difficult.
1965-66	+1,943	+14·05	+161	+1·41	Large increase in the drought effected year of 1965-66 looks improbable.
			ragi		
1958-59	+1,427	+25·37	+307	+5·14	Sharp recovery from the adverse effect of drought in 1957-58 was difficult.
1961-62	—702	—9·53	—10	—0·16	Half of the States had adverse weather conditions and the other half had favourable conditions at the time of sowing.
			barley		
1958-59	+2,439	+21·75	+600	+7·91	Sharp recovery from the adverse effect of drought in 1957-58 was difficult.

TABLE 4.3(a)—*Instances of large annual changes in the same direction in the NSS and official estimates of area for particular States and crops.*

(000 acres)

year	change from preceding year				weather conditions as per State season and crop reports and crop forecasts
	NSS (gross)		official (net)		
	extent	%	extent	%	
(1)	(2)	(3)	(4)	(5)	(6)
			Andhra Pradesh—rice		
1961-62	+2,107	+26·75	+1,067	+14·58	Weather conditions at sowing time were more favourable in 1961-62 than in 1960-61, but not so marked by favourable as to warrant a very steep rise in area.
1965-66	—117	—1·23	—796	—9·31	1965-66 being a very bad year as compared to 1964-65, unfavourable weather conditions prevailed during the sowing period. This resulted in considerable decline in the acreage.
			Bihar—maize		
1964-65	—883	—30·99	—190	—9·35	Weather conditions prevailing during 1964-65 were not so adverse as to cause steep decline in acreage.
			Maharashtra—jowar		
1961-62	—2,733	—14·53	—321	—2·07	Both favourable and unfavourable weather conditions prevailed intermittently during the sowing period and no large fluctuation in area was warranted.
			Mysore—ragi		
1963-64	+774	+29·50	+64	+2·74	Weather conditions prevailing during 1963-64 were slightly better than that during 1962-63 and improved the crop conditions to some extent.
			Rajasthan—bajra		
1961-62	—4,578	—32·25	—412	—3·68	The weather conditions prevailing during 1961-62 at the time of sowing of the crop were adverse to some extent.
			Uttar Pradesh—wheat		
1962-63	—1,722	—10·32	—150	—1·48	Weather conditions at the time of sowing were slightly unfavourable; no wide fluctuation was expected.

TABLE 4.4—*Instances of large annual changes in the same direction in the NSS and official estimates of production.*

(All-India)

(000 tons)

year	change from preceding year				weather conditions as per State season and crop reports and crop forecasts
	NSS		official		
	extent	%	extent	%	
(1)	(2)	(3)	(4)	(5)	(6)
			wheat		
1959-60	+1,743	+14·50	+366	+3·74	Explained by difference in extents of increases in area in the two series.
			jowar		
1958-59	+2590	+18·66	+391	+4·60	Explained by area increases.
1965-66	—738	—6·60	—2,221	—23·15	Increase in area according to NSS series but decrease in area according to official series further widened the gap. Further, the effect of prolonged drought during the growing period of the crop was reflected in the official estimates.
			bajra		
1960-61	—1,161	—20·58	—207	—6·02	Regions having normal rainfall during June-September and October-December were not less in 1960-61 than in 1959-60; and sharp decline was not explained.
1964-65	+239	+6·03	+709	+19·29	Explained by area increases and more favourable weather conditions during the period of growth of the crop.
			maize		
1958-59	+1,652	31·37	+308	+9·93	Explained by area increases.
1959-60	+44	+0·64	+601	+17·63	Favourable climatic conditions during the growth period of the crop in Uttar Pradesh, Punjab and Bihar and Kharif Campaign in Uttar Pradesh led to large increase.
1963-64	—499	—8·12	—25	—0·55	Adverse weather conditions in one set of States were generally counterbalanced by favourable weather conditions in another set of States and large variation was not explained.
			barley		
1959-60	+301	+8·93	+23	+0·87	Increases in Rajasthan and Uttar Pradesh as a result of favourable climatic conditions was offset by decreases in Bihar, Madhya Pradesh and Punjab due to drought conditions.
1960-61	+859	+23·40	+100	+3·74	There being no difference in the number of regions having normal rainfall in October-December and subsequent seasons in 1960-61, and 1959-60, much variation was not expected.

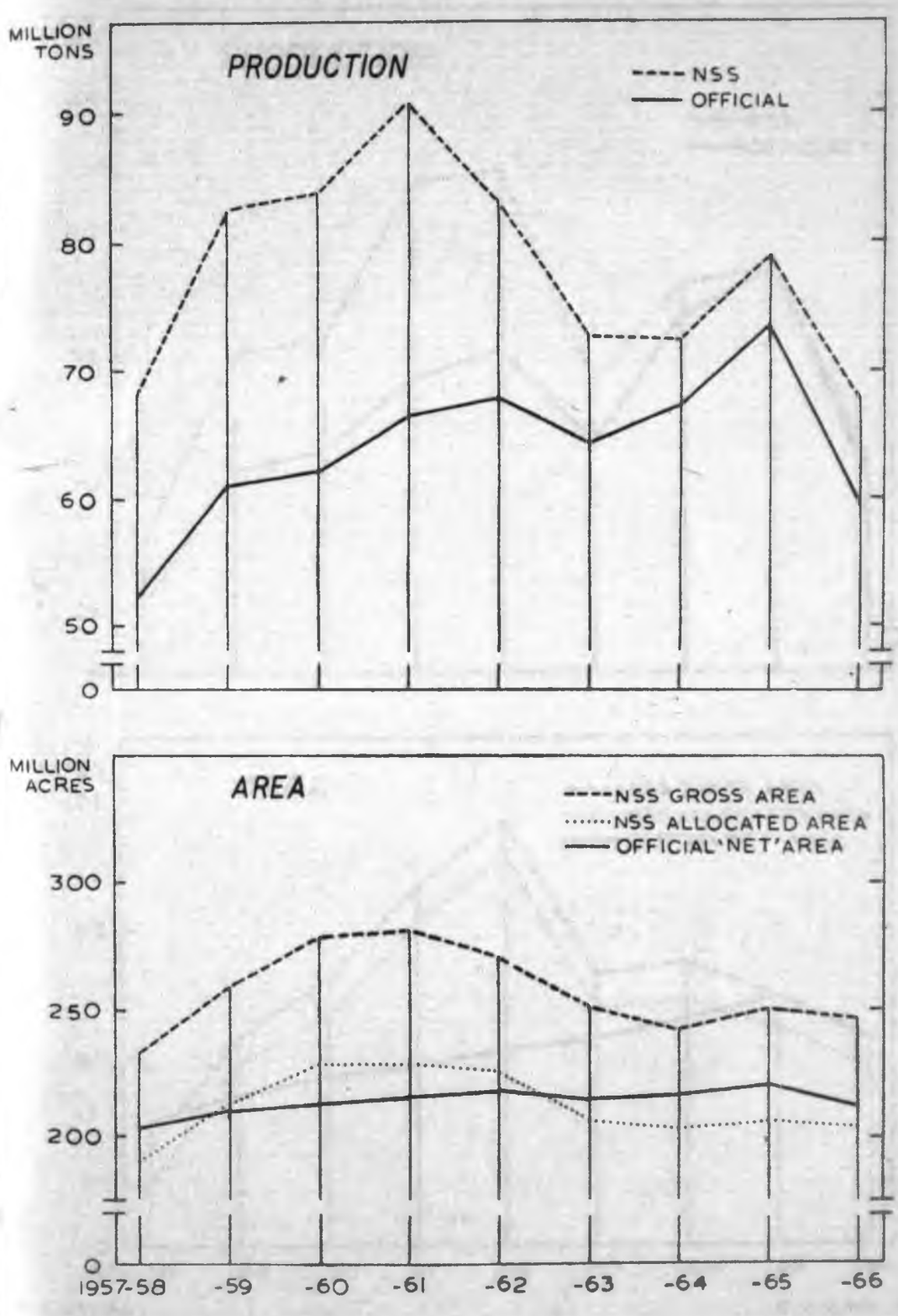
TABLE 4.4(a)—*Instances of large annual changes in the same direction in the NSS and official estimates of production for particular States and crops.*

(000 *tons*)

year	change from preceding year				weather conditions as per State season and crop reports and crop forecasts
	NSS		official		
	extent	%	extent	%	
(1)	(2)	(3)	(4)	(5)	(6)
			Andhra Pradesh—rice		
1965-66	—165	—3·12	—716	—14·87	1965-66 was very bad year characterised with prolonged drought causing a sharp decline in both area and production.
			Bihar—maize		
1964-65	—663	—53·77	—304	—34·58	The weather conditions during 1964-65 were very adverse both during the sowing and growth periods of the crop.
1965-66	+246	+43·16	+92	+16·00	Better weather conditions prevailed during the growth period of this crop in 1965-66 in comparison to 1964-65, but the difference in weather condition was not so marked as to warrant a phenomenal increase.
			Maharashtra—jowar		
1962-63	+1,039	+33·04	+299	+10·24	Favourable weather conditions stimulated the growth of the crop, but not so markedly as to cause spectacular increase.
1963-64	—350	—8·36	—49	—1·52	Weather conditions prevailing during 1963-64 had more or less similar to those prevailing in 1962-63.
1964-65	+1,049	+27·36	+79	+2·49	While the weather conditions were favourable, rabi jowar was affected by inadequate rain during the growth period.

CHARTS

NSS & OFFICIAL ESTIMATES OF PRODUCTION & AREA
SEVEN CEREALS - ALL INDIA



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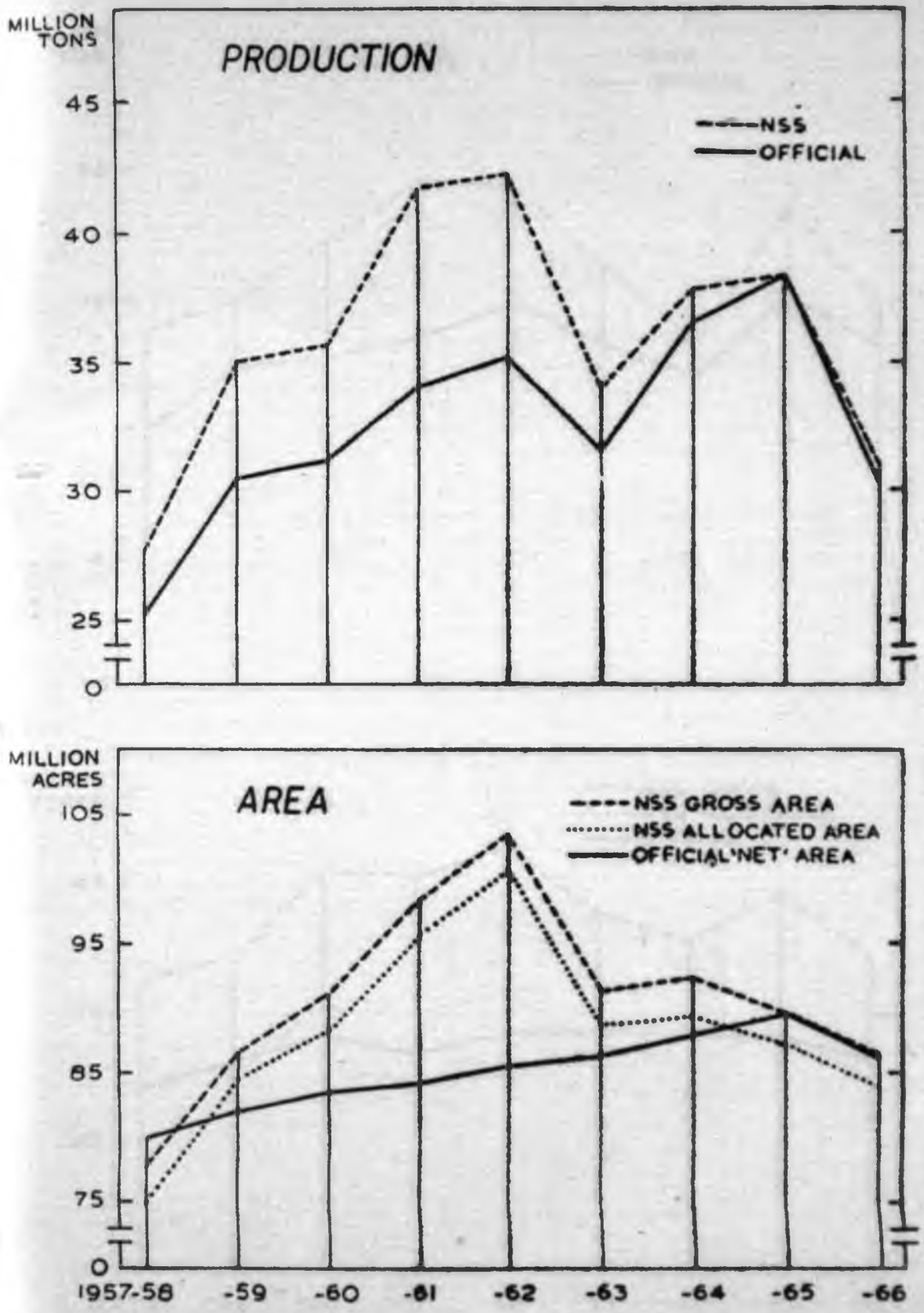
NSS & OFFICIAL ESTIMATES OF PRODUCTION & AREA
RICE - ALL INDIA



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C.S.O. NO. 209/8,88

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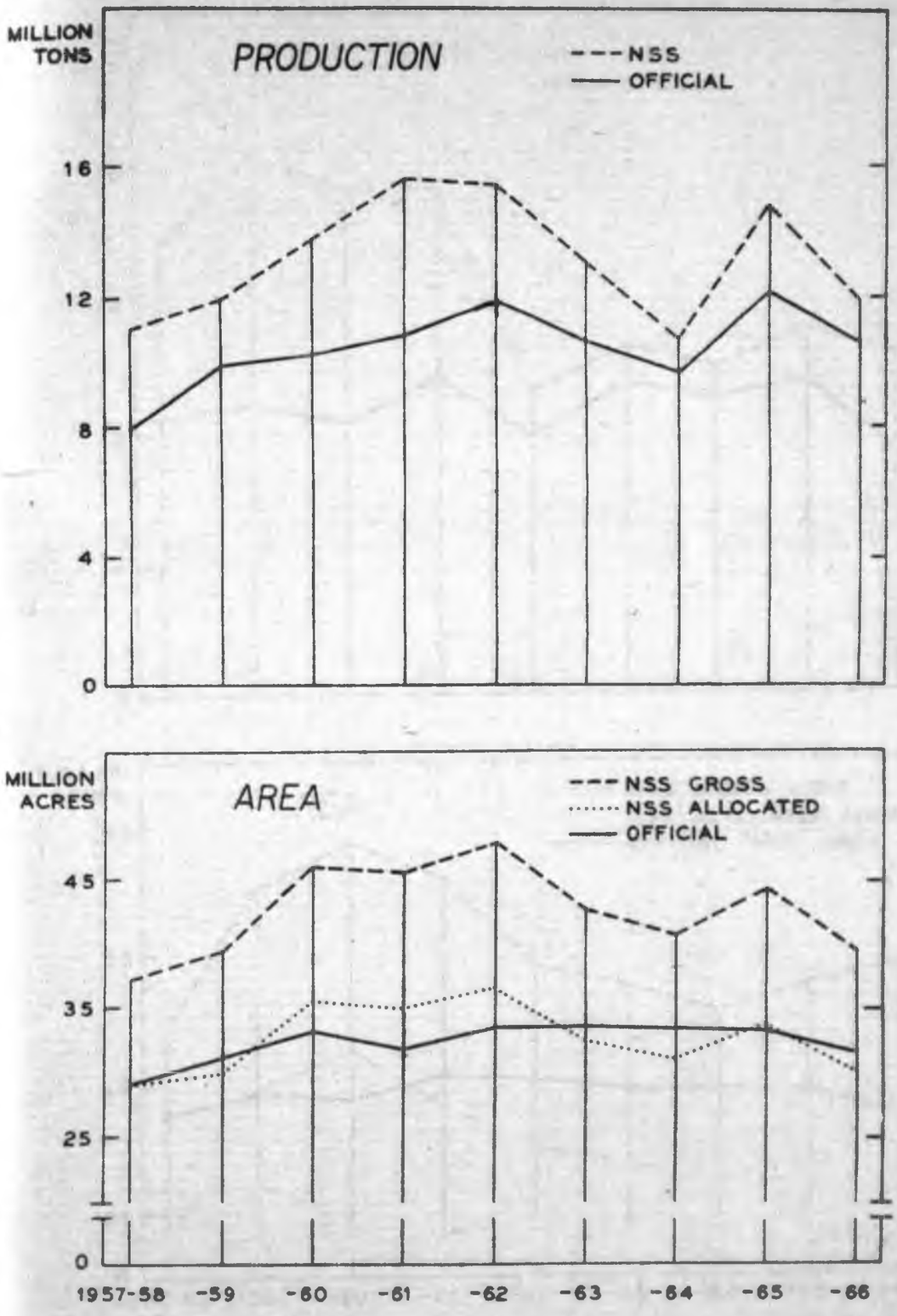
WHEAT- ALL INDIA



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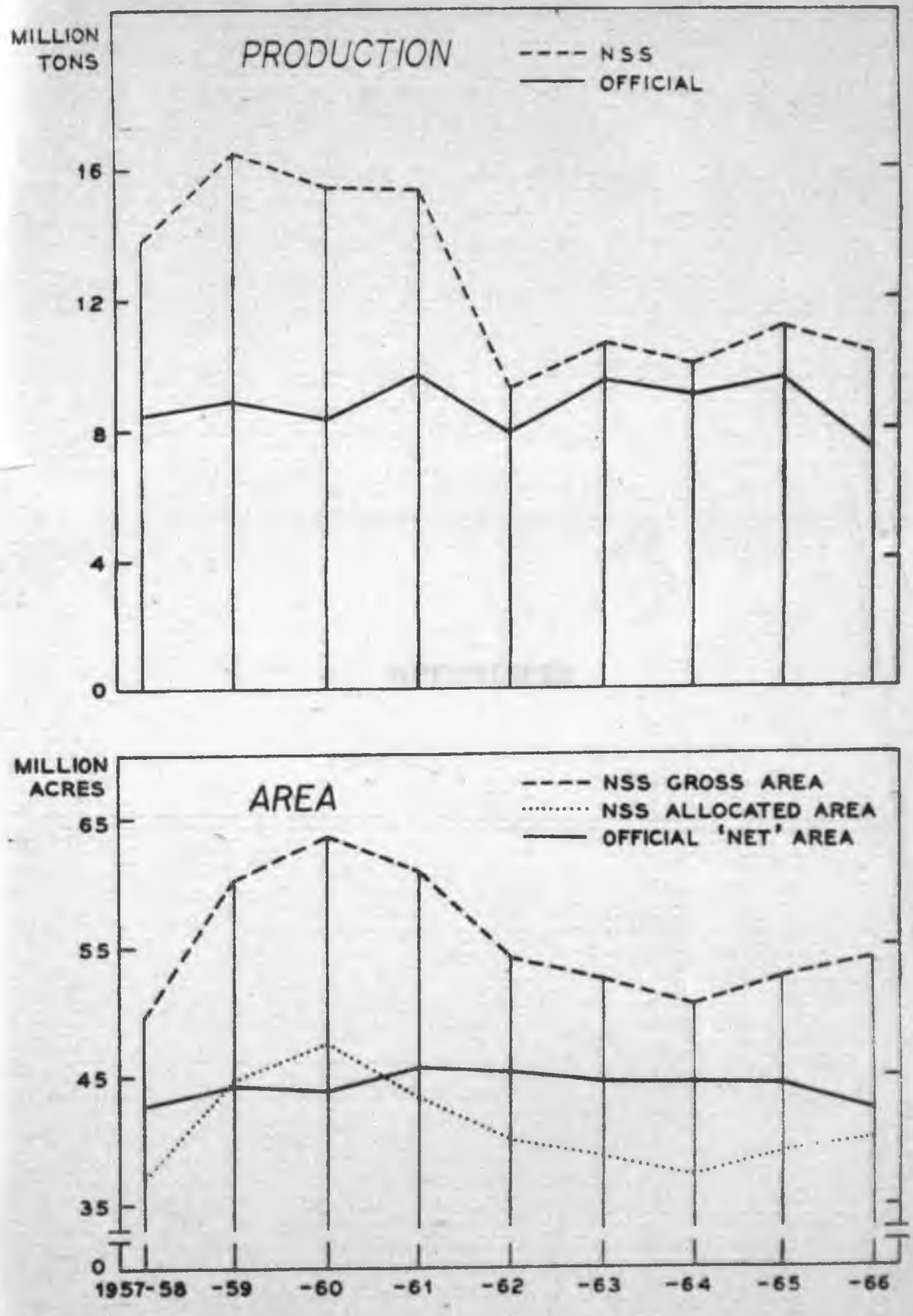
NSS & OFFICIAL ESTIMATES OF PRODUCTION & AREA
JOWAR — ALL INDIA



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C.S.O. NO. 208/8.88

APPENDICES

LIST OF APPENDICES

APPENDIX 1—*A brief note on the sample design and estimation procedure followed in the NSS crop surveys during the 13th to 20th rounds* (1957-58 *to* 1965-66).

1. *Design*

1.1 The sample design for the land utilisation survey was stratified two stage one with provision for 2 or more independent interpenetrating (net work of) sub-samples. Villages were chosen as the first stage units and clusters of plots, the second stage units. For crop-cutting experiments, a four stage design was followed, with villages, clusters of plots, fields growing specified crops, and circular cuts of radius 4 feet as the successive stages of sampling units.

1.2 *Allocation of sample villages*—In 1957-58, the total number of sample villages were first allotted to different states on the basis of the strength of available investigating staff. The allotted number of villages in a state were then distributed to the districts on a joint consideration of intensity of cultivation and geographical area of the districts. From 14th round (1958-59) onwards, the crop survey and socio-economic enquiries were conducted in an integrated manner in the same set of sample villages. In 1958-59 & 1959-60 (i.e. 14th & 15th rounds) for the purposes of the allocation, additional factors, viz., the rural population, geographical area, crop acreages and number of persons engaged in household enterprises were also considered. From 1960-61 to 1963-64, area under food crops was considered and from 1964-65 onwards, the area under cereal crops (instead of area under food crops) was considered besides rural population and strength of investigating staff. The samples allotted to a state were further distributed to the regions in that state in proportion to the rural population of the regions in 1960-61 and 1961-62 and in proportion to the total size (related to population) of the regions from 1962-63 onwards.

1.3 *Stratification*—In 1957-58, districts or groups of adjoining districts formed the strata.

1.3.1 Since 1958-59 onwards, strata were formed by grouping contiguous tehsils so that the populations of all strata within a state were more or less equal and the same number of sample villages was selected from each stratum for a round. In 1958-59 strata were formed by grouping contiguous tehsils which were homogeneous with respect to population density, altitude above sea-level and food crops so that strata populations were approximately equal.

1.3.2 For the years 1960-61 & 1961-62, the total sample size allotted to a state was further distributed to the different agricultural regions in proportion to their rural populations, the agricultural regions being formed by grouping contiguous districts (of a state) having similar cropping pattern and population density. Contiguous tehsils within a region homogeneous with respect to population density were grouped together to form strata so that population of each stratum in a state was more or less same.

1.3.4 From 1962-63 to 1965-66 contiguous tehsils or parts of contiguous tehsils homogeneous with regard to certain criteria formed the strata. The criteria for homogenity were similar population density, crop pattern and good communication facilities among the tehsils in a stratum. During these years strata in a state were formed in such a manner as to make the sum of the sizes of the villages in each stratum equal. The size of a village was defined as the census population of the village rounded off to the next higher multiple of 1,000 for the years 1962-63 and 1963-64 while for 1964-65 and 1965-66, it was taken as ratio (rounded off to the integer) of the village population to the average population of villages in the population class 0—499 of that State.

1.4 *Interpenetrating net-work of sub-samples (IPNS)*—In the NSS, the samples were selected in the form of several independent sub samples selected in an identical manner. The investigators were grouped into 2 parties in all the rounds except in the 17th round where there were three parties. The work of one or more sub-samples was allotted to a distinct party of investigators. The number of sub-samples for land utilisation as well as for crop-cutting was two for each of the years 1957-58 to 1960-61 and 1962-63 and three for 1961-62. From 1963-64 onwards, there were four sub-samples for land utilisation survey, and crop-cutting experiments were carried out in half the number of villages of each of the sub-sample 1 and 2.

1.5 *Selection of villages*—In 1957-58, villages were selected with probability proportional to geographical area with replacement. From 1958-59 to 1961-62, villages were selected systematically with equal probability while from 1962-63 onwards, they were selected with probability proportional to village size, the size being defined as the village population rounded off to the next higher multiple of 1,000 for 1962-63 & 1963-64 and as the ratio of the village population to the average population of a village in the population class 0—499 of the state for 1964-65 and 1965-66. It may be mentioned that the same set of villages were surveyed during 1958-59 and 1959-60 and 50 per cent of samples were kept common between 1964-65 and 1965-66.

1.6 *Selection of sample plots in villages*—From 1957-58 onwards, clusters of plots were selected systematically with equal probability. 8 clusters of 10 plots each were selected per village in 1957-58. From 1958-59 to 1960-61, 6 clusters of 10 plots each per village were selected. From 1961-62 onwards, in villages selected for crop-cutting, 6 clusters of 10 plots each per village were selected. In villages chosen for land utilisation without crop-cutting, 8 clusters of 5 plots per village were selected in 1961-62 while in the subsequent years this had been reduced to 4 clusters of 5 plots each. The same set of plots were surveyed in each of the seasons. Till 1961-62, the survey for summer season was not planned in the NSS. From 1962-63 onwards, summer season was also covered.

1.7 *Selection of fields for crop-cutting*—Out of the plots selected for land utilisation those plots growing the specified cereal crops (rice, jowar, bajra, ragi, maize, wheat and barley) of each season formed the frame for selection, the number of fields selected for crop-cutting was five per season per village in 1957-58. From 1958-59 onwards 6 fields per season were selected for crop-cutting in each village. In 1957-58, the fields for crop-cutting for a season were selected from all the plots (growing the specified crops of that season) with probability proportional to total allocated area under

the specified crops of that season and with replacement. In 1958-59, the sample fields were selected systematically with probability proportional to allocated area under the crop after arranging the plots growing the specified cereal crops in a specified order. From 1959-60 to 1961-62, that 6 sample fields were allocated to the different crops in proportion to the gross area under each so that at least one field would be allocated to each crop. The allotted number of fields for a crop were selected systematically from field growing the crop with probability proportional to gross area. Upto 1959-60, in a selected field, one experiment per order of selection was conducted on a crop. But from 1960-61 onwards, in fields growing jowar, bajra, maize, wheat mixed and barley mixed, two sample cuts per order of selection were conducted. From 1961-62 onwards in fields growing ragi also, two sample cuts per order of selection were conducted. But from 1962-63 onwards, no allocation of sample fields was done to different crops. The sample fields were selected from all the fields growing the specified crops systematically with probability proportional to the crop area after arranging the fields in certain specified manner.

2. *Estimation procedure*

2.1 *Area*—In 1957-58, the crop area at village was estimated on the basis of total number of plots in the village and the crop area in all the sample plots of the village. The stratum estimate of area was obtained by multiplying the village estimates by the inverse probability of selection of the respective villages. From 1958-59 to 1961-62, strata were grouped into two types—those belonging to hilly areas and the rest (i.e. not hilly). For the strata in hilly areas, stratum estimates of crop acreages were obtained based on the total number of plots in the village and the total number of villages in the stratum. In case of other strata, an estimate of proportion of crop area for the stratum was obtained by weighting the village estimate of proportion by the geographical area of the village, the village estimate of proportion being the ratio of the crop area in all the sample plots to the total geographical area of the sample plots. The stratum estimate of crop acreage was obtained by multiplying the stratum geographical area and the estimated proportion of crop area in the stratum. From 1962-63, onwards, the procedure of estimation for all the strata were similar to the one followed in 1957-58.

2.2 *Production*—In 1957-58, an estimate of production on the basis of villages selected for crop-cutting was obtained first at stratum level by inflating the village production estimates using inverse probabilities as weights. The village production estimate was obtained by multiplying the village estimate of allocated area under the crop and the corresponding mean yield of all cuts on the crop in the village. The stratum production was finally obtained by using the yield rate from the estimates of production and allocated area from the crop-cutting villages and the estimate of allocated area based on all the villages.

2.2.1 From 1958-59 onwards, estimate of production was obtained separately for the pure crop and the crop grown in mixture. The mean gross yield rate of crop was obtained separately for pure crop and mixed crop for each stratum. The production estimate of the crop in each of the two categories was obtained by multiplying the gross area and the corresponding gross yield rate of crop (unweighted). Upto 1960-61 the estimate for all sub-samples combined was obtained in the same manner as that for each sub-sample. But from 1961-62 onwards, the estimate for the combined sample was taken as the mean of the sub-sample estimates.

APPENDIX 2—*Design and estimation procedure generally followed in the official series of crop estimation surveys.*

(*Source*: Dte. of NSS)

1. *Plan of sampling and experimental procedure*—The plan of sampling adopted in the crop estimation surveys in various States is one of stratified multistage random sampling with tehsils/revenue inspector circles/subdivisions as strata (containing about 100 to 300 villages), a village as primary unit of sampling, a field growing the specified crop (pure or in mixture with other crops) as the secondary unit of sampling and a plot as the ultimate unit of sampling. The general plot size is 10m × 5m. The actual experiment consists of carefully marking at harvest time an experimental plot of specified size in the sample field and harvesting, threshing, and weighing the produce within it. The produce so weighed is in terms of grain in the case of paddy, wheat, gram, ragi, etc., and in terms of cobs in the case of jowar, bajra and maize, threshing being done after a fortnight of harvesting. Experiments are also conducted in a sub-sample to ascertain the loss due to driage. For this purpose, the cob grains from the experimental plots are required to be stored, exposed to the sun for about two weeks and dry weight recorded (in the case of jowar, bajra and maize, the dried cobs are threshed and grain separated for weighment) when the weight of the produce becomes constant.

The field work of the survey is entrusted to the staff of department of revenue (and agriculture) under the control of the respective State departments.

2. *Method of estimation of yield rate and production*—Tabulation of the data is carried out in each State in the office of the State statistician responsible for directing the work of the crop-cutting experiments. For each stratum, a simple arithmetic mean of the net yield of sample plots is obtained. For this, the plot yields from the mixed sown fields are divided by the corresponding eye-estimates of the proportion of area under the crop in the field and added to the yields of all the plots sown with the pure crop to obtain an estimate of the stratum average. The district average is obtained by weighting the stratum average in proportion to the net area under the crop in different strata. The state average is obtained by combining the district averages in proportion to the net area under the crop in the districts. The averages are corrected for driage, the estimates of which are obtained from the results of driage experiments.

The above is the method of estimation followed in general though in some States, it is somewhat different. Thus in Uttar Pradesh, strata averages are obtained separately for the pure and mixed categories of crops (without dividing the actual plot yields of the fields sown with mixtures by the eye estimates of the proportionate area under the crop) and these are multiplied by the corresponding gross areas (under the pure and different categories of mixed crops) added up and then divided by the estimated net area under the crop to give the district estimate of the net average yield. Netting of areas at district/State level is done by the State land records departments on the basis of ratios regarded as established in practice.

No formula of moderation or adjustment is applied to State yield rate or production obtained on the basis of above calculations except that a reduction of about 2 to 3 per cent is made on account of area under bund for estimates of rice in many States.

3. *Estimate of production*—Estimate of production (metric tonnes) of a given crop in a district is given by

$$d \times \cdot 0002 \sum_{i=1}^{t} A_i \left\{ \frac{\sum_{j=1}^{n_i} \sum_{k=1}^{m_{ij}} (x_{ijk}/p_{ijk})}{\sum_{j=1}^{n_i} m_{ij}} \right\}$$

where x_{ijk} = plot yield in grams (plot size 10m × 5m) of the crop in the k th field of j th village in the i th stratum,

p_{ijk} = the proportion of area under the experimental crop in the corresponding field in the case of mixed sown crop,

m_{ij} = number of sample fields in the j th village of the i th stratum,

n_i = number of sample villages in the i th stratum,

A_i = net area under the crop in i th stratum (equal to area under the pure crop plus area under the crop as apportioned from the field sown with the crop in mixture with other crops, apportionment being carried out at the field level in some states and at district level in others, on the basis of eye-estimate and conventional ratios respectively),

.0002 = conversion factor to obtain outturn in metric tonnes.

d = the driage factor,

t = number of strata in district (a tehsil generally being a stratum).

This is the general expression for the outturn of a crop in a State covering mixture crops also, the value of p_{ijk} being 1 in case the crop is sown pure. For mixture crops, the proportion of area under the experimental crop (p_{ijk} is estimated by the field staff from the sample field by eye appraisal.

The driage factors are applied to the estimates of green yield generally at the district/State level. The green weight is the weight of the grain obtained after threshing the produce (weight of the cobs in the case of jowar, bajra and maize) on the harvesting day. The allowance for driage is determined on the basis of a sub-sample of plots and is estimated from the results of the reweightment of the sample yields after about a fortnight. In the case of jowar, bajra and maize, however, the cobs are threshed after they become dry to obtain the grain and the ratio of the weight of the grain to the weight of green cobs is taken as the driage factor.

APPENDIX 3—*Design of non-NSS crop estimation surveys in Kerala, Orissa and West Bengal*

(*Source*: Dte. of NSS)

1. *Kerala*

1.1 The design adopted for crop estimation surveys in Kerala is one of stratified multi-stage sampling with talukas as strata, villages as primary unit for sample and field as secondary units with a square plot of size $16\frac{1}{2}' \times 16\frac{1}{2}'$ as ultimate unit. Till 1958-59, villages were allocated to each taluka roughly in proportion to the extent of paddy cultivation. Villages were selected by simple random and from each village 5 fields were selected.

1.2 From 1958-59, the method of location of villages among talukas and the procedure for selection of fields have been revised. The number of villages allotted to each taluka is 6 and a systematic sample of 5 paddy fields is chosen from each sample village. If a field has more than one bunded portion (Kandom), one of the bunded portions is selected with probability proportion to area.

1.3 These have also undergone slight revisions since 1964-65. Six villages are selected in each taluka with probability proportion to size, size being defined by the extent of wet land area. In each village, 3 fields growing the crop are selected.

1.4 The size of the ultimate unit is 1/160th of an acre ($16\frac{1}{2}' \times 16\frac{1}{2}'$).

1.5 Normally a total of 1,400 experiments are planned during each of autumn and winter seasons and about half the number during the summer season.

2. *Orissa*

2.1 The design adopted for crop estimation surveys in Orissa is one of stratified two-stage random sample. The whole State is divided into number of strata consisting of groups of contiguous police stations on the consideration of the geographical area, cultivated area and geographical features. The strata are so formed to lie within the district concerned. From each stratum, a sample of 20 villages is selected with probability proportion to area and with replacement. Out of these 20 villages, a sub-sample of 10 villages is drawn up for yield estimation. In each selected village, 6 clusters of 10 survey numbers are selected for systematic sampling with a random start for land utilisation survey.

2.2 In each of the 10 crop-cutting villages, 2 (or 3) crop-cutting experiments are planned for yield estimation. The clusters remain common for land utilisation survey in both the sub-rounds (autumn and winter), whereas the plots for crop-cutting experiments are selected afresh during each season. The ultimate unit for crop cutting is a circle of radius 4′ randomly located in each field.

2.3 A total of 3,600 villages, constituting 7 per cent of the total number of villages in the State, is selected for land utilisation. Out of these, in 1,800 villages crop cutting experiments are organised in 3,630 plots on autumn rice and 5,100 for winter rice.

3. *West Bengal*

The following gives a brief description of the design adopted for crop estimation surveys in West Bengal.

3.1 The ultimate sampling unit for land utilisation survey is a grid of square size, with an area of 2.25 acres. Sample grids are distributed over each police station at a density of one per half a square mile of area to be surveyed. These are drawn systematically from all the police stations arranged serially. The first mouza in each police station from which sample will be taken is selected at random from the list of Mouza Maps of the particular police station, care being taken to include the entire list of mouzas in a cyclic order. For the purposes of locating samples, cumulative totals of mouza areas are prepared commencing from the first mouza selected as mentioned above.

3.2 Samples are selected for locating mouza maps by using random co-ordinates.

3.3 Squares representing the size of 2.25 acres are stamped on the maps with one corner falling on the point chosen by the random co-ordinates, the corner to be chosen in an order prescribed for the purpose. All the plots included in the square of area 2.25 acres, either wholly or partially, are listed in a prescribed form.

3.4 All samples are divided into two equal parts, designated as 'Sub-sample A' and 'Sub-sample B', the totality of all alternate grids constituting a sub-sample. Grids are chosen afresh every year.

3.5 For purposes of crop-cutting experiments, 30 grids are selected at random in each police station. The primary worker will take note of the grids and plots in regard to availability of crops for which crop-cutting experiments are to be carried out. Not more than one cut in respect of any particular crop is taken in any one grid, but if more than one crop is under experimentation, as many cuts as the number of experimental crops, are taken from each grid. The number of cuts entrusted to any primary worker is of the order of 30 during a season.

3.6 The following is the size of the ultimate cut for different crops: —

serial no.	crops	size of the ultimate cut
(*i*)	jute	circular area 100 sq. ft. i.e. a circle of radius 5′—6″ which is further divided into concentric circles of radii 2′ and 4′ respectively.
(*ii*)	autumn paddy	
(*iii*)	winter paddy	
(*iv*)	all rabi crops excepting the one mentioned below.	
(*v*)	potato	two cuts of the following sizes :— (*i*) 15′ × 15′ (*ii*) 5 lines × 15′
(*vi*)	arhar	
(*vii*)	sugarcane	

APPENDIX 4—*Primary field agency in the official series of crop estimation surveys—food crops*

(*Source*: Dte. of NSS)

state	crops	primary field agency
(1)	(2)	(3)
1. A.P.	rice	Agricultural Extension Officers.
	jowar, maize, rape & tur bajra	Revenue Inspectors. Progress Asstts/Taluk Stat. Assts.
2. Assam	all crops	Special staff (Directorate of Statistics)
3. Bihar	maize	Amins and Field Investigators (Dept. of Statistics) Circle Inspectors (Revenue) and Junior Statistical Supervisors (Community Development).
	onion & potato	Amins and Field Investigators (Deptt. of Statistics).
	other crops	Circle Inspectors (Revenue)
4. Gujarat	all crops	Gram Sevaks/Panchayat Circle Inspectors/Revenue Circle Inspectors/Revenue Circle Officers.
5. J. & K.	all crops	Girdawar Kanungos.
6. Kerala	rice	Investigators (Department of Statistics).
7. M.P.	all crops	Revenue Inspectors.
8. Madas	rice other crops	Agricultural Demonstrators. Revenue Inspectors.
9. Maharashtra	all crops	Circle Inspectors/Circle officers/Revenue Inspectors/V.L.Ws.
10. Mysore	all crops	Revenue Inspectors and Agricultural Inspectors.
11. Orissa	rice	Amin of the Bureau of Statistics and Economics.
12. Punjab	all crops	Selection of fields by Patwaris and actual conduct of experiments by Agri. Extension officers/Compost Inspectors.
13. Rajasthan	all crops	Land Records Inspectors
14. U.P.	urd, mung and masur/ all other crops	Agri. Deve. officers (Agri)/Supervisor Kanungos (Revenue Deptt.)
15. W. Bengal	all crops	Assistant Investigators of the State Statistical Bureau.
16. Delhi	all crops	V.L.W.s
17. H.P.	all crops	Girdawar Kanungos.

NOTE.—In Kanya Kumari district of Madras State, experiments on paddy are entrusted to State Statistical staff.

APPENDIX 5—*Primary field agency in the official series of crop estimation surveys—non-food crops*

(*Source*: Dte. of NSS)

state	crops	primary field agency
(1)	(2)	(3)
1. A.P.	sugarcane, cotton, tobcco & castor.	Agricultural Extension Officers.
	g. nut, sesamum & castor	Progress Asstts/Taluk Stat. Asstts.
2. Assam	all crops	Field Assistants of the Department of Economics and Statistics.
3. Bihar	jute, sugarcane & mesta	Amins & Junior Field Investigators (Deptt. of Statistics) Junior Statistical Supervisors (Community Development) Circle Inspectors (Revenue).
4. Gujarat	all crops	Gram sevaks/Panchayat Circle Inspectors Revenue Circle Inspectors/Revenue Circle Officers.
5. M.P.	all crops	Revenue Inspectors.
6. Madras	all crops	Agricultural staff
7. Maharashtra	all crops	Circle Inspectors/Circle Officers/Revenue Inspectors/V.L.Ws.
8. Mysore	cotton and sugarcane	Special Agricultural Inspectors.
	oilseeds	Revenue and Agricultural Inspectors
9. Orissa	jute	Jute Development Staff.
10. Punjab	all crops	Selection of fields by Patwaris and actual conduct of expts. by Agri Extension Officers, Compost Inspectors.
11. Rajasthan	all crops	Land Records Inspectors.
12. U.P.	cotton	Cotton Supervisors.
	jute	Jute Development Staff.
	oilseeds	Supervisor Kanungos (Revenue)
	sugarcane	Cane Development staff for factory areas and Supervisor Kanungos (Revenue) for other areas.
13. W. Bengal	all crops	Assistant Investigators of the State Statistical Bureau.

APPENDIX 6—*Response rates in crop estimation surveys (official series)*

(*Source*: Dte. of NSS)

State		percentage response							
		1957-58	1958-59	1959-60	1960-61	1961-62	1962-63	1963-64	1964-65
(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
					1. *rice*				
1. Andhra Pradesh									
	(Abi)	82	89	81	81	81	83	80	89
	(Tabi)	64	71	68	66	57	70	72	74
2. Assam	(A)	92	90	99	97	100	95	98	98
	(W)	94	87	99	99	99	86	99	98
3. Bihar	(A)	49	83	84	65	77	68	72	81
	(W)	65	95	94	82	82	84	84	95
4. Gujarat		87	81	64	63	76	72	81	84
5. Jammu and Kashmir		..	77	70	68	74	70	91	91
6. Kerala	(A)	..	..	..	..	74	70	91	87
	(W)	..	..	..	..	58	56	85	82
	(S)	..	..	..	..	82	92	98	84
7. Madhya Pradesh		92	93	94	85	75	92	93	92
8. Madras		82	69	75	74	82	66	84	92
9. Maharashtra		87	81	56	53	86	86	79	88
10. Mysore		76	69	76	84	80	84	79	86
11. Orissa	(A)	..	..	..	..	34	42	53	55
	(W)	..	..	..	..	84	93	97	97
	(S)	..	..	..	..	..	..	43	51
12. Punjab		75	65	54	54	69	51	61	60
13. Uttar Pradesh		91	94	94	95	92	93	90	87
14. West Bengal (Aus)		..	..	..	..	..	..	71	74
	(Aman)	..	..	..	..	..	..	84	83
15. Himachal Pradesh		75	77	69	80	84	80	91	73
States covered	..	77	88	81	77	78	79	81	83

APPENDIX 6—*Response rates in crop estimation surveys (official series)*—contd.

State		percentage response							
		1957-58	1958-59	1959-60	1960-61	1961-62	1962-63	1963-64	1964-65
(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
					jowar				
1. Andhra Pradesh	(K)	60	60	65	63	64	74	71	78
	(R)	67	63	55	45	43	74	72	82
2. Gujarat	(K)	84	79	49	58	52	57	69	49
	(R)	82	67	42	30	62	58	73	72
3. Madhya Pradesh		84	93	90	93	89	88	89	92
4. Madras		23	90	23	32	37	52	57	74
5. Maharashtra	(K)	84	79	63	71	81	78	75	76
	(R)	82	67	30	44	75	81	59	67
6. Mysore	(K)	70	51	79	94	86	91	93	94
	(R)	65	47	50	65	66	85	82	86
7. Punjab		56	32	39	25	47	46	36	N.A.
8. Rajasthan		79	77	79	70	77	83	85	90
9. Uttar Pradesh		91	91	91	94	90	94	90	87
States covered		76	71	63	66	70	76	75	77
					bajra				
1. Andhra Pradesh		62	70	51	56	58	62	72	87
2. Gujarat		83	80	73	54	69	64	76	80
3. Madhya Pradesh		63	92	98	95	92	97	96	94
4. Madras		18	13	24	20	30	40	57	71
5. Maharashtra		83	80	71	65	78	86	70	77
6. Mysore		73	54	55	91	88	92	92	93
7. Punjab		61	48	47	53	48	47	49	49
8. Rajasthan		81	88	85	75	84	82	82	88
9. Uttar Pradesh		92	92	95	94	90	93	90	88
10. Delhi		..	..	58	49	65	67	42	79
States covered		74	73	70	66	71	74	76	81

APPENDIX 6—*Response rates in crop estimation surveys (official series)*—contd.

State	Percentage response							
	1957-58	1958-59	1959-60	1960-61	1961-62	1962-63	1963-64	1964-65
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
				maize				
1. Andhra Pradesh	72	63	67	90	77	74	71	71
2. Bihar (A)	..	..	88	86	81	82	92	82
(S)	..	..	..	..	85	100	86	88
3. Gujarat	80	82	63	53	69	67	73	70
4. Jammu and Kashmir	..	..	64	52	58	56	85	90
5. Madhya Pradesh	33	82	78	88	80	88	94	93
6. Punjab	59	46	49	51	53	49	51	45
7. Rajasthan	89	87	88	84	91	94	95	94
8. Uttar Pradesh	91	89	92	91	89	91	89	86
9. Himachal Pradesh	82	80	57	68	83	70	91	73
States covered	77	83	76	77	78	78	82	79
				ragi				
1. Andhra Pradesh	43	45	48	52	51	65	60	73
2. Gujarat	81	87	..	..	89	80	50	60
3. Madras	23	22	29	33	28	42	54	62
4. Maharashtra	81	87	70	74	71	84	84	83
5. Mysore	62	53	70	90	77	79	80	92
States covered	46	51	48	56	51	64	68	77

APPENDIX 6—*Response rates in crop estimation surveys (official series)*—contd.

State	percentage response							
	1957-58	1958-59	1959-60	1960-61	1961-62	1962-63	1963-64	1964-65
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
wheat								
1. Bihar	N.A.	N.A.	N.A.	82	78	74	86	86
2. Gujarat	79	79	65	46	59	52	78	77
3. Jammu and Kashmir	83	89	82	88	82	92	98	95
4. Madhya Pradesh	90	91	92	88	93	91	89	93
5. Maharashtra	79	79	57	65	77	78	63	74
6. Mysore	72	53	55	80	83	94	73	96
7. Punjab	72	67	66	79	66	70	56	71
8. Rajasthan	81	83	74	79	83	93	90	88
9. Uttar Pradesh	97	93	94	95	90	94	90	93
10. West Bengal	..	..	..	..	..	..	80	76
11. Himachal Pradesh	78	81	92	87	90	85	72	91
12. Delhi	..	80	76	69	80	81	92	87
States covered	85	83	77	79	81	83	80	85
barley								
1. Bihar	N.A.	N.A.	N.A.	73	78	74	85	83
2. Madhya Pradesh	78	91	86	84	87	85	94	92
3. Punjab	54	38	53	59	58	58	48	46
4. Rajasthan	83	81	75	83	84	92	90	89
5. Uttar Pradesh	96	94	94	92	87	91	88	92
6. West Bengal	..	..	..	..	..	..	83	91
7. Himachal Pradesh	..	..	94	69	71	64	87	80
States covered	87	89	86	83	83	85	85	87

APPENDIX 7—*Number of fields selected for crop-cutting experiments and number of fields where experiments were actually conducted, NSS series,* 1964-65 (*19th round*)

sub-sample : 1 season : autumn

state	number of sample villages				number of fields originally selected for crop-cutting	number of fields originally selected where crop-cutting were done	number of fields substituted	total number of fields where crop-cutting were conducted	percentage of substituted fields col. 8 / col. 6 × 100	response rate col 9 / col. 6 × 100
	planned	surveyed	reporting specified crops	not reporting crops						
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Andhra Pradesh	84	84	66	18	342	304	28	332	8·19	97
Assam	45	44	3	41	17	13	..	13	0·00	76
Bihar	96	96	66	30	378	336	13	349	3·28	90
Gujarat	45	45	41	4	231	229	2	231	0·90	100
Jammu and Kashmir	45	45	43	2	258	246	6	252	2·33	98
Kerala	45	45	38	7	108	87	21	108	19·44	100
Madhya Pradesh	90	87	56	31	307	266	30	296	9·77	96
Madras	78	77	63	14	361	330	31	361	8·59	100
Maharashtra	87	87	69	18	375	363	12	375	3·20	100
Mysore	51	50	18	32	103	88	4	92	3·88	89
Orissa	45	41	26	15	135	112	8	120	5·93	89
Punjab	45	45	41	4	219	193	7	200	3·20	91
Rajasthan	48	48	45	3	261	238	32	261	8·81	100
Uttar Pradesh	132	132	122	10	717	676	40	716	5·58	100
West Bengal	69	69	25	44	135	101	10	111	7·41	82
Delhi	3	..	..	..	..	..	..	..	..	..
Himachal Pradesh	3	3	3	..	18	18	..	18	0·00	100
Manipur	24	19	1	18	6	6	..	6	0·00	100
Tripura	24	20	16	4	86	59	13	72	15·12	84
All-India	1,059	1,037	742	295	4,057	3,665	248	3,913	6·11	96

APPENDIX 7—*contd.*

sub sample : 1 season : winter

state	number of sample villages				number of fields originally selected for crop-cutting	number of fields originally selected where crop-cutting were done	number of fields selected	total number of fields where crop-cutting were conducted	percentage of substituted fields col. 8 / col. 6 × 100	response rate col. 9 / col. 6 × 100
	planned	surveyed	reporting specified crops	not reporting crops						
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Andhra Pradesh	84	83	72	11	423	385	36	421	8·51	100
Assam	45	43	34	9	197	192	4	196	2·03	99
Bihar	96	96	90	6	532	472	50	522	9·40	98
Gujarat	45	45	8	37	44	36	5	41	11·36	93
Jammu and Kashmir	45	45	..	45	..	..	..	..	..	..
Kerala	45	45	35	10	210	204	6	210	2·86	100
Madhya Pradesh	90	88	70	18	396	333	39	372	9·85	94
Madras	78	76	61	15	362	328	32	360	8·84	99
Maharashtra	87	86	54	32	318	270	40	310	12·58	97
Mysore	51	51	44	7	249	219	18	237	7·23	95
Orissa	45	44	42	2	252	209	39	248	15·48	98
Punjab	45	43	..	43	..	..	..	..	..	..
Rajasthan	48	47	14	33	74	62	7	69	9·46	93
Uttar Pradesh	132	130	98	32	534	461	63	524	11·80	98
West Bengal	69	68	61	7	362	284	65	349	17·96	96
Delhi	3	3	..	3	..	..	..	..	..	..
Himachal Pradesh	3	3	..	3	..	..	..	..	..	..
Manipur	24	21	20	1	120	120	..	120	..	100
Tripura	24	20	14	6	80	74	..	74	..	92
All-India	1,059	1,037	717	320	4,180	3,672	404	4,076	9·67	98

APPENDIX 7—*contd.*

sub sample : 1 season : spring

state	number of sample villages				number of fields originally selected for crop-cutting	number of fields originally selected where crop-cutting were done	number of fields selected	total number of fields where crop-cutting were conducted	percentage of sub-stituted fields col. 8 / col. 6 × 100	response rate col. 9 / col. 6 × 100
	planned	surveyed	reporting specified crops	not reporting crops						
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Andhra Pradesh	84	74	38	36	222	195	18	213	8·11	96
Assam	45	39	..	39	..	..	..	..	..	..
Bihar	96	93	70	23	359	319	24	343	6·69	96
Gujarat	45	45	28	17	146	139	7	146	4·79	100
Jammu and Kashmir	45	45	13	32	78	78	..	78	..	100
Kerala	45	45	11	34	63	60	3	63	4·76	100
Madhya Pradesh	90	87	60	27	278	260	18	281	6·47	100
Madras	78	77	59	18	354	330	24	354	6·78	100
Maharashtra	87	85	65	20	359	348	4	352	1·11	98
Mysore	51	48	24	24	139	136	3	139	2·16	100
Orissa	45	44	1	43	1	..	..	..	..	..
Punjab	45	40	40	..	240	234	6	240	2·50	..
Rajasthan	48	40	41	7	220	208	8	216	3·64	98
Uttar Pradesh	132	128	122	6	726	699	27	726	3·72	100
West Bengal	69	61	8	53	43	36	2	38	4·65	88
Delhi	3	3	3	..	18	15	..	15	0·0	83
Himachal Pradesh	3	2	1	1	1	..	..	..	..	..
Manipur	24	22	..	22	..	..	..	..	..	..
Tripura	24	21	1	20	6	5	..	5	0·00	83
All-India	1,059	1,007	585	422	3,248	3,062	144	3,209	4·43	99

APPENDIX 7—*contd.*

sub-sample: season : summer

state	number of sample villages				number of fields originally selected for crop-cutting	number of fields originally selected where crop-cutting were done	number of fields substituted	total number of fields where crop-cutting were conducted	percentage of substituted fileds col. 8 / col. 6 × 100	response rate col. 9 / col. 6 × 100
	planned	surveyed	reporting specified crops	not reporting crops						
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Andhra Pradesh	84	81	18	63	102	94	2	96	1·96	94
Assam	45	44	38	6	17	..	..	..	..	..
Bihar	96	94	93	1	..	..	..	..	..	..
Gujarat	45	39	6	33	30	26	..	26	..	87
Jammu and Kashmir	45	45	6	39	33	33	..	33	..	100
Kerala	45	43	2	41	12	8	4	12	33·33	100
Madhya Pradesh	90	86	84	2	..	..	..	..	..	..
Madras	78	78	35	43	197	170	21	191	10·66	97
Maharashtra	87	84	84	..	..	..	..	..	..	..
Mysore	51	50	8	42	42	34	3	37	7·14	88
Orissa	45	45	45	..	..	..	..	..	..	..
Punjab	45	43	36	7	..	..	..	..	..	..
Rajasthan	48	47	1	46	5	5	..	5	..	100
Uttar Pradesh	132	125	5	120	27	26	1	27	3·70	100
West Bengal	69	65	61	4	..	..	..	..	..	..
Delhi	3	3	3	..	..	..	..	..	..	..
Himachal Pradesh	3	3	3	..	..	..	..	..	..	..
Manipur	24	24	24	..	..	..	..	..	..	..
Tripura	24	22	1	21	5	5	..	5	..	100
Total	1,059	1,021	553	468	453	401	31	432	6·84	95

APPENDIX 7—*contd.*

sub-sample : 1 all seasons

state	number of fields originally selected for crop-cutting	number of fields originally selected where crop-cutting were done	number of fields substituted	total number of fields where crop cutting were conducted	percentage of substituted col. 4 / col. 8 × 100	response rate col. 5 / col. 3 × 100
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1. Andhra Pradesh .	1,089	978	84	1,062	7·71	97
2. Assam . . .	214	205	4	209	1·87	98
3. Bihar . . .	1,538	1,127	87	1,214	5·66	79
4. Gujarat . . .	605	430	14	444	2·31	73
5. Jammu and Kashmir	477	357	6	363	1·26	76
6. Kerala . . .	393	359	34	393	8·65	160
7. Madhya Pradesh .	981	859	87	949	6·87	97
8. Madras . . .	1,274	1,158	108	1,266	8·48	99
9. Maharashtra . .	1,052	981	56	1,037	5·32	99
10. Mysore . . .	533	477	28	505	5·25	95
11. Orissa . . .	388	321	47	368	12·11	95
12. Punjab . . .	459	427	13	440	2·83	96
13. Rajasthan . .	560	513	38	551	6·79	98
14. Uttar Pradesh . .	2,004	1,862	131	1,993	6·54	99
15. West Bengal . .	540	421	77	498	14·26	92
16. Delhi . . .	18	15	..	51	0·00	83
17. Himachal Pradesh .	19	18	..	18	0·00	95
18. Manipur . . .	126	126	..	126	0·00	100
19. Tripura . . .	177	143	13	156	7·34	88
20. All-India . .	12,447	10,777	827	11,607	6·64	93

APPENDIX 8—*Procedure followed in different States for recording of net areas of crops for the 'official' estimates*

(*Source*: Dte. of Economics and Statistics)

The gross areas of some major crop-mixtures which are widely practised, are published by some States in their annual Tables of Agricultural Statistics and/or Season and Crop Report. In respect of other crop-mixtures in these States and all crop-mixtures in other States, the proportionate net areas of each component crop from all crop mixtures involving it are obtained and added to the area sown singly (pure) with it to give its net area which alone is published.

2. The allocation of gross area of a crop-mixture to its different component crops is done either at the source, i.e., at the field level, by the patwari during the course of his crop-inspection (girdawari or partal) and the net area of each component crop is recorded separately in the crop statement (jinswar), or the patwari is allowed to record the whole area of the crop-mixture treating it as a single crop and the total area of the mixture is separated to the component crops at the district level. The assignment of net areas to different component crops at the field level is made in proportion to the number of their rows, if they are sown in separate lines. In case the crops in the mixture are sown after thoroughly mixing the seeds, this allocation is done in proportion to actual amounts of seeds sown or seed-rates adjusted for mixed sowing or by eye-estimation of the relative stands of component crops. The components occupying negligible area or area below certain specified minimum are in some States, ignored and their areas allocated to the chief component alone or proportionately to all major components of the mixture. The apportionment of net areas of component crops of a mixture at the district-level is done on the basis of a fixed ratio which is supposed to represent the average conditions with regard to one or more of the aforesaid factors for all the fields of the mixture in the district.

3. The different States in India can be grouped under the following 3 categories with regard to the procedure followed in allocation of net areas of component crops of a mixture:—

(1) States in which allocation is done entirely at the field level.

(2) States in which certain major crop-mixtures are recognised as single crops and allocation of net areas of their components is done not at the field level but at the district level, while in the case of un-recognised mixtures the allocation is done at the field level.

(3) States in which the allocation is done entirely at the district level on the basis of fixed ratios.

(1) *Allocation at field level*:

Under the first category can be listed the States of Assam, Bengal, Andhra Pradesh, Madras, Mysore, Orissa, Maharashtra, Gujarat and Kerala. In most of these States mixed cropping is not very important.

In Assam, mostly two crop-mixtures are reported to be sown. The practice of sowing three or more crops as substantial components of the mixture is rare. Therefore, the Land Records Manual prescribes a simple rule that the gross area should be allocated half-half between the two principal components, the subsidiary crops, if any, being ignored altogether.

The acreage under crop-mixtures is reported to be small in *West Bengal* also. No special procedure is, therefore, laid down for plots having mixed crops. The instruction to the field staff is that in such cases an estimate of the extent of each individual crop in terms of number of plants covering the field should be made. Taking the entire plot as equivalent of 16 annas, the areas should be allocated to each crop so as to total to 16 annas for all crops in the plot.

The Land Records Manual for the Telangana region of *Andhra Pradesh* prescribes that if the constituent crops are sown in separate rows, the area of the mixed field should be allocated to them in proportion to the number of their rows. But if the seeds of constituent crops are mixed together and then sown, the net areas of component crops should be apportioned in the ratio of adjusted seed rates. For example, if *a* seers, *b* seers and *c* seers are the seeds employed for sowing a mixture of three crops in an acre of land and if *l* seers, *m* seers and *n* seers are their normal seed-rates when sown pure, the proportion of the areas of the constituent crops is estimated as a/l : b/m : c/n. If one or two components of the mixed sowing are not important and their proportions are extremely small, say a few plants scattered here and there in the field, they are ignored, and the whole area is shown as pure provided the remaining constituent crop is one only, if the remaining constituent crop still happens to be a mixture, the net acreage under each of them is separated on the basis of adjusted seed, rates as explained above.

In the remaining parts of Andhra Pradesh and the whole of *Madras, Mysore, Orissa and Gujarat States* and the whole Maharashtra State excepting Wardha, Bhandara, Nagpur and Chanda Districts, the areas occupied by components of a crop-mixture are apportioned on the spot by the primary reporting agency presumably in proportion to the number of their rows in the case of row-sowing and by eye-appraisal of the relative stands of their plants in the case of mixed-seed sowing.

In Kerala, the procedure adopted in the case of a mixture of a perennial crop and a seasonal crop is to record the number of trees and plants of the perennial crop and the area actually under the seasonal crop. In the case of mixtures of two perennial crops, the number of trees or plants of each is recorded separately. In the case of the mixture of two seasonal crops, the procedure of the 'corrected seed rates' is followed and the apportionment is done on the spot by the Investigators.

(2) *Allocation partly at field and partly at district level*:

Under the second category can be grouped the States of Bihar, Punjab, Rajasthan and Jammu & Kashmir. In *Bihar,* the field-level primary reporter (Karmachari) records the gross area in the case of wheat-gram, wheat-barley and barley-gram mixtures without apportioning net areas of the components. In respect of other mixtures, he apportions the gross area to component crops by taking into consideration the quantities of seeds sown and the nature and extent of the crops grown, assessed on the basis of his

own personal knowledge and judgement and information gathered from reliable and intelligent cultivators. The components which appear to occupy one per cent or less area of the whole field are treated as nominal crops and are ignored and their areas are distributed to the remaining components. If one or more additional components are sown mixed with a recognised two-crop mixture and each appears to occupy more than 1 per cent of the area of the mixed field, the area of each one of them is apportioned and recorded under it and the balance is recorded under the recognised mixture.

In *Punjab,* the patwari records at the source both the gross unadjusted acreages and the net acreages of the components of the mixtures of wheat and gram; wheat and barley; wheat, gram, barley and massar; wheat and sarshaf; wheat, gram and sarshaf; barley and gram; jowar and bajra; jowar and gowara; jowar and moth or mung or mash; bajra and moth or mung or mash; maize and mash; cotton, til and mash or moth or mung; barley and massar; and gram and massar which constitute the major crop-mixtures in the State. In respect of the mixtures of wheat and barley, and wheat and gram, half the area under the mixture is reckoned as under-wheat. In the case of other mixtures, the patwari makes an eye-appraisement of the ratios in which the mixtures are grown and apportions the gross area to the component crops at the source itself.

In *Rajasthan,* crop-mixtures like gojara (wheat-barley), gochani (wheat-gram), bejar (barley-gram), jowar-mung and bajra-muth are entered as mixed in the crop-statement and areas of the components are not apportioned by the patwari. But in the case of other mixtures, the estimated area covered by each constituent is recorded.

In *Jammu and Kashmir,* allocation of area under mixed crops to its components is done at the primary stage except in the case of goji (wheat-barley). The patwari makes the allocation according to eye-estimate taking seed-ratio also into consideration. In the case of goji, the acreage is recorded as such from the primary stage to the final stage.

(3) *Allocation at district level*:

Under the third category can be placed the States of Uttar Pradesh and Madhya Pradesh. In *Uttar Pradesh,* some major crop mixtures like jowar-arhar, bajra-arhar, cotton-arhar, wheat-barley, wheat-gram and barley-gram are recognised and are each allotted a column in the crop statement (jinswar). In the case of a recognised crop-mixture, with or without some subsidiary crops also added, the whole area is recorded under the heading mentioned in the crop statement. Obviously, if a crop mixture consists of 3 or more crops but the heading recognises only two crops, the whole area is recorded under this heading, the subsidiary crops being ignored altogether. For example, the whole area of wheat-barley-linseed mixture is recorded under the heading 'wheat-barley' as there is no such heading as 'wheat-barley-linseed" in the crop-statement and thus the linseed crop is ignored totally at the field level. Other oilseeds crops like rape and mustard, sesamum, castor and groundnut are also ignored in a similar manner at the field-level. However, in the case of mixed linseed, its net area is calculated at the district level by taking half the total acreage under gram plus one-sixth of the total acreage under wheat and barley and their mixtures. Some such procedure is followed in respect of rapeseed and sesamum crops also. But no such calculation is made in the case of other oilseed crops sown mixed.

In all the constituent units, *viz.*, Mahakoshal, Madhya Bharat, Vindhya Pradesh and Bhopal regions of the present *Madhya Pradesh* State, and Wardha, Nagpur, Chanda and Bhandara district of the Maharashtra State, a few recognised mixtures like cotton-tur (arhar), jowar-tur, bajra-tur, wheat-gram, wheat-barley, barley-gram, wheat-linseed, linseed-gram, urad-linseed, lakh-linseed, kodo-tur, kodo-jowar, koda-jowar-arhar, etc., are allotted separate columns in the crop-statement (jinswar) and the areas of these mixtures are recorded as such under the respective columns. If a mixture to which no special heading is allotted in the crop-statement is sown, it is described by the name which it ordinarily bears and its mixed area is recorded. There is, however, one important difference between the Mahakoshal, Madhya Bharat and Bhopal regions on the one hand and Vindhya Pradesh region on the other, with regard to recording of areas of subsidiary crops which are added in the main recognised or widely practised mixtures. In the first three units, the subsidiary crops are ignored, but in last unit, the area covered by each subsidiary crop is estimated on the basis of quantities of seeds sown and relative stands of component crops and apportioned and recorded separately by the patwari on the spot and the balance is shown under the recognised mixture.

4. The assignment of net areas to component crops at the district level in the case of recognised mixtures in the States listed under second and third categories above, is done on the basis of prescribed ratios. The ratios fixed in the different States are given below for important crop mixtures for illustration:—

State	ratio fixed for apportionment of net areas of component crops of the mixture				
	wheat-gram	wheat-linseed	gram-linseed	wheat-barley	gram-barley
Uttar Pradesh	50 : 50	..	..	50 : 50	75 : 25 to 50 : 50@
Madhya Pradesh	90 : 10 to 50 : 50@	95 : 5 to 50 : 50@	95 : 5 to 20 : 80@	..	..
Punjab	50 : 50	..	..	50 : 50	50 : 50
Bihar	50 : 50	..	.	50 : 50	50 : 50
Rajasthan	70 : 30 to 39 : 61@	..	..	66 : 34 to 34 : 66@	50 : 50 to 34 : 66@

@ The range indicates that different ratios are prescribed for different tracts or districts.

5. The above ratios were fixed mostly at the time of settlements and were based on scanty observations. The characters which were observed by the Settlement and Revenue Officers for fixing these ratios are not clearly specified in the circulars which prescribe them, but the basis had been an admixture of all types of observations and subjective assessments made with regard to relative stands of crops, pure and mixed seed-rates, relative spread of the practices of line-sowing and broadcast sowing, etc.

Allocation when components are harvested in different seasons:

6. Crops sown in mixture simultaneously or in the same season are generally treated as mixed crops, whether they are harvested in the same season or in different seasons. Thus, in most States jowar-tur (arhar), cotton-tur, maize-tur, kodo-tur, the components of which are sown simultaneously in the kharif season, but the first component is harvested in this season and the second in the rabi season, are treated as mixtures and the whole gross area is divided between the component crops at the field or district level, according to the prevalent practice. The whole area of such mixtures is treated as double-cropped and is recorded under the first component (maize or kodo, etc.) in the kharif season as well as under the second component (arhar) in the rabi season.

APPENDIX 9—*Procedure followed for framing preliminary, final, partially revised and revised estimates (official series)*

(*Source*: Directorate of Economic & Statistics)

The first or preliminary estimate for a crop is generally issued about a month after the completion of sowings and is intended to give an idea about the area sown to the crop and to afford intelligence regarding germination, weather conditions, and crop prospects. The second estimate generally follows about a couple of months later and indicates the area (including late sowings), the condition of the crop and the probable or expected yield in some cases. The final estimate contains estimates of the total area sown and yield harvested or expected to be harvested. An important distinction between the object and purpose of the final and pre-final estimates needs to be borne in mind. While pre-final estimates are intended to give an indication of what the production is likely to be, the final estimate mainly concerns itself with the actual quantity produced. Further, for the pre-final estimates, the primary reporting agency is required to give only rough quantitative estimates of area under the current crop compared with the previous year's crop. The final estimate, on the other hand, is generally based on field to field crop inspection.

The final estimates are, however, themselves subject to revision, if deemed necessary in the light of subsequent information. Such revision, if any, is generally done at the time of release of the final estimate of the next year's crop. These revised estimates are called "Partially Revised Estimates", as they might be incomplete for want of some returns from some States. These partially revised estimates are subsequently revised when complete returns are obtained from the States, and these are known as "Revised Estimates".

In preparing final estimates at the State level, in the absence of information in respect of certain areas, generally previous year's figures are used, but the extent of these areas is quite negligible in comparison to the total area corresponding to final estimates as will be seen from Annexure I.

The crops on which crop-cutting experiments are conducted and the results of which are utilised for framing official estimates of crop production are given in Annexure II. There are certain crops on which crop-cutting experiments are conducted but results are not utilised for framing estimates of food production. The reasons for not utilising the results are mainly (i) high non-response, (ii) late receipt of returns at the State headquarters, (iii) inadequate coverage and (iv) high sampling errors.

During 1964-65, about 95 per cent of all-India cereals production and 70 per cent of the all-India pulses production were based on crop-cutting surveys. Crop-wise details are given in Annexure III. These percentages in respect of rice and wheat, the two major cereals were 97 and 99 respectively. Among the commercial crops, the percentages of production based on crop-cutting surveys was 76 for groundnut, 71 for cotton, 99 for jute and 79 for sugarcane.

Generally the final forecast estimates include the results of all the crop-cutting experiments conducted 15—20 days before the issue of the final forecast. In the partially revised estimates, the results of crop-cutting experiments received from the field after the preparation of final forecast are also included. The number of experiments on which the estimates are based is practically the same for partially revised and revised estimates.

Annexure IV gives the difference between the various estimates, *viz.*, final, partially revised and revised at all-India level for the years 1959-60 to 1961-62 in respect of rice, jowar, maize, bajra, ragi, wheat and barley. It would be seen that the difference among the various estimates is mostly below 5 per cent.

ANNEXURE I

crop	are a in respect of which previous year's figures were used in final estimate of 1964-65 (thousand hectares)	area at all-India level as per 1964-65 final estimate (thousand hectares)
rice	69·3	36,076·4
jowar-kharif	0·2.	11,013·5
bajra	0·5	11,712·1
ragi	2·5	2,429·3
small millets	0·5	4,554·9
gram	48·4	9,010·5
tur	33·5	2,473·4
kharif pulses (other than tur)	36·8	6,396 2

ANNEXURE II

Statement showing the position regarding the use of the results of crop cutting experiments in framing estimates of production

State	Region (if any)	Crops in respect of which production estimates are based on the results of crop cutting experiments	Year from which the results of crop-cutting experiments are used
(1)	(2)	(3)	(4)
1. Andhra Pradesh	Telengana	wheat	1951-52
		rice, jowar, bajra & maize	1952-53
		ragi	1955-56
		sugarcane	1956-57
		groundnut, tur & sesamum	1959-60
		cotton & tobacco	1962-63
	Andhra region	rice	1953-54
		jowar, bajra, maize, ragi & sugarcane	1954-55
		groundnut, tur & sesamum	1959-60
		cotton & tobacco	1962-63
2. Assam		rice	1951-52
		jute, potato (winter)	1952-53
		sugarcane	1957-58
		rapeseed & mustard	1958-59
		mati kalai (urad)	1962-63
		potato (summer)	1963-64
3. Bihar		rice & wheat	1948-49
		barley & gram	1949-50
		sugarcane & jute	1958-59
		maize	1959-60
		mesta, tur & potato (summer)	1962-63
		potato (winter)	1963-64
4. Gujarat	former Bombay State	rice, jowar, bajra & wheat	1949-50
		maize, gram, cotton, groundnut, tobacco.	1951-52
		ragi (dangs clist only) & kodra	1961-62
	Saurashtra & Kutch regions.	kodra	1961-62
		rice, wheat, jowar, bajra & gram.	1956-57
		groundnut, cotton	1957-58
5. Kerala		rice	1957-58
6. Madhya Pradesh	Mahakoshal region	rice, jowar, wheat, gram, kodon-kutki & tur.	1951-52
		bajra	1956-57

ANNEXURE II—*contd.*

(1)	(2)	(3)	(4)
6. Madhya Pradesh	Mahakoshal region—	barley, groundnut, rapeseed & mustard linseed, sesamum, cotton, lakh & khesari and potato (summer)	1957-58
		maize	1958-59
		chillies	1962-63
		potato (winter)	1963-64
	Vindhya Pradesh	rice, jowar, maize, wheat, barley & gram.	1952-53
		bajra	1956-57
		tur, groundnut, rapeseed & mustard, linseed	1957-58
		potato (summer), kondon kutki, sesamum, lahk & khesari, cotton.	1957-58
		chillies	1962-63
		potato (winter)	1963-64
	Bhopal	rice, jowar, wheat	1951-52
		gram	1952-53
		bajra	1956-57
		barley, tur, groundnut, rapeseed & mustard, linseed, potato (summer) kondon kutki, sesamum, cotton, lakh & khesari	1957-58
		maize	1958-59
		chillies	1962-63
		potato (winter)	1963-64
	Madhya Bharat	rice jowar, gram	1955-56
		bajra	1956-57
		wheat, barley, tur & groundnut.	1957-58
		rapeseed & mustard, linseed, sesamum, kondon kutki, potato (summer), cotton lakh & kehsari,	1958-59
		chillies	1962-63
		potato (winter)	1963-64
7. Madras		rice, jowar, bajra, ragi	1955-56
		groundnut & sugarcane	1964-65
8. Maharashtra	former Bombay State	rice, jowar, bajra & wheat	1949-50
		ragi (ratnagiri district only)	1951-52
		ragi (Kolaba, Nasik & Kolhapur districts.)	1962-63
		cotton, tobacco, gram ground nut.	1951-52
		tobacco (Satara, Sangli & Kolhapur).	1958-59
	Vidarbha region	rice, jowar, wheat, gram, tur, kondan-kutki.	1951-52
		cotton	1954-55
		groundnut	1957-58
		bajra	1958-59

ANNEXURE II—*contd.*

(1)	(2)	(3)	(4)
8. Maharashtra	Marathwada	wheat	1951-52
		rice, jowar, bajra & maize	1952-53
		groundnut, cotton, gram	1957-58
		sugarcane	1964 65
9. Mysore		rice, jowar, bajra, ragi	1951-52
		wheat, gram, tur	1957-58
		sesamum, sugarcane, ground nut	1958-59
		linseed	1961-62
		cotton	1963-64
		castor seed	1964-65
10. Orissa		rice & jute	1959-60
11. Punjab	including Pepsu	bajra, maize,	1952 53
		gram sugarcane, wheat.	1961-62
	former Punjab State	rice, jowar, barley	1952-53
12. Rajasthan	excluding Ajmer	jowar, bajra, maize	1952-53
		cotton	1953-54
		rapeseed & mustard	1957-58
		linseed & sesamum	1958-59
	Ajmer	wheat	1952-53
		jowar, maize, barley	1953-54
		cotton & gram	1956-57
		sesamum & linseed	1958-59
		rapeseed and mustard	1957-58
13. Uttar Pradesh	State excluding hilly region of Kumaon & Uttar Khand Division	wheat, barley, gram	1949-50
		rice, jowar, bajra, maize, tur	1950-51
		jute	1955-56
		groundnuts, rapeseed & mustard	1957-58
		peas, sesamum & linseed	1959-60
		cotton & sugarcane	1960-61
	Hilly Region of Kumaon & Uttar Khand Division	rice, ragi, wheat & barley	1961-62
14. West-Bengal		rice	1947-48
		wheat, barley, gram, jute, rapeseed & mustard & linseed	1949-50
		sugarcane	1950-51
		jute, potato (winter)	1951-52
		tur, rabi, pulses (except kulthi & others)	1952-53
15. Delhi		wheat	1952-53
		gram	1958-59
16. Himachal Pradesh		rice, wheat	1953-54
		maize—(excluding chamba)	1958-59
		maize—chamba	1961-62
		barley	1964-65

Annexure III

Percentage of area under principal crops on which crop-cutting surveys have been conducted to total area under the crop, 1964-65 *and* 1963-64

(thousand hectares)

crop	total area		area on which crop-cutting surveys have been conducted		percentage of area under principal crops on which c.c. surveys have been conducted to total area	
	1964-65	1963-64	1964-65	1963-64	1964-65	1963-64
(1)	(2)	(3)	(4)	(5)	(6)	(7)
cereals						
rice	36,076·4	35,622·2	35,032·6	34,615·2	97·1	97·2
jowar	18,012·0	17,956·3	17,983·1	17,920·3	99·8	99·8
bajra	11,712·1	10,785·4	11,642·8	10,722·0	99·4	99·4
maize	4,591·1	4,584·2	4,195·8	4,199·8	91·4	91·6
ragi	2,429·3	2,400·1	1,965·9	1,942·2	80·9	80·9
small millets	4,554·9	4,579·5	1,285·7	1,311·7	28·2	28·6
wheat	13,453·4	13,495·7	13,241·4	13,267·6	98·4	98·3
barley	2,667·6	2,774·9	2,606·2	2,713·3	97·7	97·8
total cereals	93,496·8	92,198·3	87,953·5	86,692·1	94·1	94·0
pulses						
gram	9,010·5	9,376·1	8,864·2	9,229·4	98·4	98·4
other kharif pulses	6,396·2	6,197·3	..	..	..	..
tur	2,473·4	2,440·8	1,913·0	1,905·0	77·3	78·0
other rabi pulses	6,106·0	6,040·3	2,147·8	2,309·2	35·2	38·2
total pulses	23,986·1	24,054·5	12,925·0	13,443·6	53·9	55·9
total foodgrains	117,482·9	116,252·8	100,878·5	100,135·7	85·9	86·1
oilseeds						
groundnut	7,072·0	6,808·8	5,730·4	5,499·9	81·0	80·8
castorseed	449·4	477·4	..	..	..	..
sesamum	2,503·1	2,395·2	1,265·0	1,178·3	50·5	49·2
rapeseed & mustard	2,813·8	3,022·6	744·6	832·1	26·5	27·5
mustard linseed	2,010·7	2,006·3	923·4	944·8	45·9	47·1
total oilseeds	14,849·0	14,710·3	8,663·4	8,455·1	58·3	57·5
fibres						
cotton	8,153·8	8,160·0	7,028·6	7,012·9	86·2	85·9
jute	841·3	868·1	831·6	856·2	98·8	98·6
mesta	359·1	393·4	57·0	64·8	15·9	16·5
other crops						
sugarcane	2,544·1	2,256·9	2,113·1	1,868·6	83·1	82·8
potato	416·6	405·0	202·5	193·8	48·6	47·9
tobacco	423·1	440·3	———	not available	———	
chillies	713·5	727·5	44·9	46·7	6·3	6·4

ANNEXURE III—*contd.*

Percentage of production under principal crops on which crop-cutting surveys have been conducted to total production under the crop, 1964-65 *and* 1963-64.

(thousand tonnes unless otherwise stated)

crop	total production		production based on c.c. surveys		percentage of production based on c.c. surveys to total production	
	1964-65	1963-64	1964-65	1963-64	1964-65	3
(1)	(2)	(3)	(4)	(5)	(6)	(7)
cereals						
rice	38,732·3	36,888·7	37,746·4	35,830·8	97·5	97·1
jowar	9,810·5	9,134·5	9,796·9	9,117·7	99·9	99·8
bajra	4,465·2	3,734·3	4,427·7	3,700·5	99·2	99·1
maize	4,558·1	4,553·4	4,242·3	4,268·7	93·1	93·7
ragi	1,920·6	1,962·0	1,632·0	1,665·6	85·0	84·9
small millets	1,976·7	2,016·6	352·7	371·6	17·8	18·4
wheat	12,078·3	9,860·7	11,970·8	9,730·1	99·1	98·7
barley	2,478·1	2,037·4	2,445·5	1,995·8	98·7	98·0
total cereals	6,019·8	70,187·6	72,614·5	66,680·8	95·5	95·0
pulses						
gram	5,763·1	4,498·9	5,709·2	4,445·5	99·1	98·8
tur	1,893·9	1,370·6	1,613·5	1,103·0	85·2	80·5
other kharif pulses	1,703·8	1,553·7	..	..	..	..
other rabi pulses	3,017·1	2,632·5	1,383·7	1,047·2	45·9	39·8
total pulses	12,377·9	10,055·7	8,706·4	6,595·7	70·3	65 6
total food-grains	88,397·7	80,243·3	81,320·9	73,276·5	92·0	91·3
oilseeds						
groundnut	6,175·9	5,215·1	4,698·5	3,812·9	76·1	73·1
castorseed	100·9	102·4	..	..	..	..
sesamum	466·2	439·3	176·2	156·3	37·8	35·6
rapeseed & mustard	1,375·0	902·5	297·7	226·0	21·6	25·0
linseed	465·8	378·7	193·7	175·7	41·6	46·4
total oilseeds	8,583·8	7,038·0	5,366·1	4,370·9	62·5	62· 1
fibres						
cotton	*5,407·7	*5,494·4	*3,824·3	*3,910·5	70·7	71·2
jute	*6,079·4	*6,184·8	*6,018·9	*6,103·0	99·0	98·7
mesta	*1,588·7	*1,874·1	*237·0	*332·0	14·9	17·7
other crops						
sugarcane (gur)	12,315·0	10,596·4	9,766·0	8,197·6	79·3	77·4
potato	3,452·4	2,554·1	1,779·5	1,425·1	51·5	55·0
tobacco	369·7	358·4	——— not available ———			
chillies (dry)	454·7	456·0	17·7	12·4	3·9	2·7

*In thousand bales of 180 kgs. each.

Annexure IV

Variations in the different estimates of area and production, namely final, partially revised and fully revised, at the all-India level, 1959-60

(area '000 hectares and production '000 tonnes)

crop	Area					production				
	final f	partially revised pr	revised r	$\frac{f-pr}{pr}\times 100$	$\frac{f-r}{r}\times 100$	final f	partially revised pr	revised r	$\frac{f-pr}{pr}\times 100$	$\frac{f-r}{r}\times 100$
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
rice	32,918	33,519	33,820	1·79	2·67	29,809	31,460	31,676	5·25	5·89
jowar	16,836	17,061	17,707	1·32	4·92	7,992	8,132	8,579	1·72	6·84
baira	10,805	10,825	10,695	0·18	1·03	3,540	3,576	3,493	1·01	1·35
maize	4,232	4,332	4,344	2·31	2·34	3,673	4,070	4,073	9·75	9·82
ragi	2,514	2,414	2,518	4·14	0·16	1,890	1,935	1,986	2·33	4·83
wheat	12,751	13,169	13,380	3·17	4·70	9,890	10,251	10,324	3·52	4·20
barley	3,326	3,377	3,378	1·51	1·56	2,647	2,717	2,717	2·58	2·58

ANNEXURE IV—*contd.*

Variations in the different estimates of area and production, namely final, partially revised and fully revised, at the all-India level, 1960-61

(area '000' hectares and production '000' tonnes)

crop	area					production				
	final f	partially revised pr	revised r	$\frac{f-pr}{pr}\times 100$	$\frac{f-r}{r}\times 100$	final f	partially revised pr	revised r	$\frac{f-pr}{pr}\times 100$	$\frac{f-r}{r}\times 100$
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
rice	33,724	33,567	34,128	0·47	1·18	34,241	34,198	34,574	0·13	0·945
jowar	17,040	17,273	18,412	1·35	7·45	9,231	9,363	9,814	1·41	5·9
rajra	11,356	11,424	11,469	0·60	0·98	3,184	3,228	3,823	1·3 6	16·7[1]
maize	4,354	4,360	4,407	0·14	1·20	3,978	4,015	4,080	0·92	2·50
ragi	2,331	2,322	2,515	0·39	7·31	1,666	1,681	1,838	0·89	9·36
wheat	12,849	12,969	12,927	0·93	0·60	10,819	10,992	10,997	1·57	1·62
barley	3,204	3,223	3,205	0·59	0·03	2,778	2,866	2,819	3·07	1·45

ANNEXURE IV—*contd.*

Variations in the different estimates of area and production, namely final, partially revised and fully revised, at the all-India level, 1961-62

area '000' hectares and productin '000' tonnes)

crop	areas					production				
	final f	partially revised pr	revised r	$\frac{f-pr}{pr}\times 100$	$\frac{f-r}{r}\times 100$	final r	partially revised pr	revised r	$\frac{f-pr}{pr}\times 100$	$\frac{f-r}{r}\times 100$
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
rice	33,859	34,256	34,094	1·16	2·41	34,149	34,807	35,863	1·89	3·96
jowar	17,431	17,798	18,249	2·06	4·48	7,697	7,741	8,029	0·59	3·11
bajra	10,937	11,057	11,278	1·09	3·02	3,558	3,554	3,645	0·11	2·38
maize	4,468	4,493	4,507	0·56	0·87	4,064	4,269	4,312	4·80	5·75
ragi	2,311	2,367	2,511	2·37	7·96	1,777	1,873	2,030	5·12	12·46
wheat	13,452	13,520	13,570	0·50	0·87	11,807	12,039	12,072	1·93	2·19
barley	3,341	3,315	3,312	0·78	0·88	3,116	3,152	3,150	1·14	1·09

APPENDIX 10—*List of items for special research studies.*

1. *NSS series*

(i) Frequency distribution of yield observations by crop and years (for important States).

(ii) Distribution of unweighted yield rates for pure crop and mixed crop.

(iii) Percentage recovery of dried grain from harvested produce for individual States—crops and years from 1957-58 onwards (sub-sample-wise figures).

(iv) Investigations into the biases (if any) in production estimates due to the use of inaccurate (or out-of-date) driage factors and/or due to the application of the driage ratios at inappropriate stages.

(v) Relative merits (bias and variance) of estimates of acreage and production of crops according to different selection and estimation procedures including those actually used.

(vi) (Investigations into the reasons for divergence or inconsistency among different official series of geographical areas, and their relative role in respect of the resulting) inaccuracies in estimates of area and production due to the use of inaccurate expansion factors or for other similar reasons.

(vii) Study of biases (if any) in the estimates of yield rate of given crops due to the rule or procedure of allocation of sample cuts to pure and mixed crops in any of the rounds.

(viii) Study of bias in production estimates in case (if any) the methods of apportionment of area under each component of mixed crop (a) for area survey and (b) for sample crop cuts differ in any of the rounds.

(ix) Characteristics of the 'non-responding' units; assessment of related bias. Nature of 'substitutions' and assessment of bias.

(x) Investigations into the possibility of double count or omission in crop acreage enumeration in repeated visits in different seasons.

(xi) Comparison of repeat samples (villages/survey numbers) between successive sub-rounds (seasons) and successive rounds (years) to assess the reliability of data.

(xii) Study of trends in gross area in selected States (and comparison of NSS trends with 'official trends').

(xiii) Comparison of State matching sample estimates with central sample estimates: study of reasons for divergence (if any).

2. *Official series*

(i) Frequency distribution of yield observations by crops and years (for important States).

(ii) Distribution of unweighted yield rates for pure crop and mixed crop.

(iii) Percentage recovery of dried grain from harvested produce for individual States—crops and years from 1957-58 onwards.

(iv) Investigations into the biases (if any) in production estimates due to the use of inaccurate (or out-of-date) driage factors, and/or due to the application of driage ratios at inappropriate stages.

(v) Relative merits (biases and/or variance) of different modes of complication, derivation or estimation of acreage under crops, and of different modes of selection and estimation for crop production, including those actually used.

(vi) (Investigations into the reasons for divergence or inconsistency among different official series of geographical areas, and their relative role in respect of the resulting) inaccuracies in the figures or estimates of area and production due to the use of inaccurate expansion factors or for other similar reasons.

(vii) Study of biases (if any) in the estimates of yield-rate of given crops due to the official rule or procedure of allocation of sample cuts to pure and mixed crops.

(viii) Study of bias in production estimates in case (if any) the methods of apportionment of area under each component of mixed crop (a) for area survey and (b) for sample crop cuts differ.

(ix) Characteristics of the 'non-responding' or 'non-reporting' units; assessment of related bias. Nature of 'substitutions' and assessment of bias.

(x) Investigations into the possibility of double count or omission in crop acreage enumerations in repeated visits in different seasons.

(xi) Comparison of repeat tehsils/villages/survey numbers (samples) between the successive seasons and the successive years to assess the reliability of the data.

(xii) Study of trends in gross area in States where the required data are available, (and comparison of the 'official trends' with the 'NSS trends').

(xiii) Comparison of official acreage estimates with data collected according to official procedure by the NSS (central). Causes of divergence (if any).

(xiv) Assessment of errors of recording, aggregation, and transfer of official area statistics at different levels,—village, tehsil, district and State. Study of cumulative effect of such errors.

(xv) Investigations into the effect of non-compliance of instructions in the Land Records manual. Formulation of well-considered concepts and procedures for recording area under crop mixtures so as to arrive at appropriate net area in all cases.

3. *General*

(i) Reasons for divergence between different series of official geographic area figures.

(ii) Relationship between weather conditions and the area and production of crops.

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