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Vol XXII
No. 1

ISSN 0019-5014

JANUARY-
MARCH
1967

INDIAN JOURNAL OF AGRICULTURAL ECONOMICS

INDIAN SOCIETY OF
AGRICULTURAL ECONOMICS,
BOMBAY

MEASUREMENT OF GROWTH RATES IN AGRICULTURE*

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Growth Rates in Agriculture, 1949-50 to 1964-65, issued by the Economic and Statistical Advisor, Ministry of Food and Agriculture, March 1966, may be taken as the official measurement of growth in agriculture. In the following paper the effect of several methodological aspects of this study on the measured rates of growth will be indicated, namely, the aspects of comparability, weights, form of trend expression, and time spans.

COMPARABILITY

Comparability refers to the annual index numbers on which the trends are based. These index numbers are built up from link-relatives which show change for given reporting regions having the same form of reporting for a given pair of years. Thus in years 1, 2, and 3 the reporting regions might include region A only for year 1, A and B for year 2, and A, B and C in year 3. If output in year 1 was reported as 150, and 170 in year 2, consisting of 165 from A and 5 from B, then the percentage change between years 1 and 2 would be 10 per cent and the index number for year 2, with year 1 taken as 100, would be 110. For year 3 output might have been 210 with 204 coming from A and B, and the index standing at 132 reflecting the 20 per cent increase between years 2 and 3 for the comparable regional coverage of A and B.

This method avoids erroneous impression that output grew from 150 to 170 and then 210, but it implies that growth in region B between years 1 and 2 was the same as in region A, whereas in fact it may well not have been. Likewise between years 2 and 3 it is implied that growth in region C was the same as in combined regions A and B.

An example of how the change in output for a previously unreported region compared with output for rest of India in later years is shown in Table I for *tur*.[1] Assam, Mysore, and Orissa were reported for the first time in 1950-51. For 1949-50 to 1950-51 the index construction assumes that the percentage change in output was the same as in rest of India. For later pairs of years it can be seen that, despite the wide distribution of these States, there were notable differences in the relative changes, the average spread having been about twenty percentage points. The possible error in all-India index number for 1950-51 (because of absence of 1949-50 reports for this region) must have been small, however, because these three States accounted at most for only 6 per cent of all-India output in later reporting years.

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* Research for this paper was completed while the author was in India as a Faculty Research Fellow of the American Institute of Indian Studies, 1965-66. The author wishes to thank Dr. C. H. Shah, Department of Economics, University of Bombay, Bombay, for comments which were helpful in the construction of this paper.

1. Cited as a case of major change in reporting coverage by V. G. Panse and V. S. Menon, "Index Numbers of Agricultural Production in India," *Agricultural Situation in India*, Vol. XVI, No. 5, August, 1961, also published in *Indian Journal of Agricultural Economics*, Vol. XVI, No. 2, April-June, 1961.

TABLE I—LINK-RELATIVES FOR TUR OUTPUT IN ASSAM-MYSORE-ORISSA AND REST OF INDIA

(percentage)

	Assam-Mysore-Orissa	Rest of India
1950-51 to 1951-52	78.3	105.8
1951-52 to 1952-53	150.0	93.4
1952-53 to 1953-54	92.6	100.1
1953-54 to 1954-55	100.0	100.8
1954-55 to 1955-56	108.0	107.3
1955-56 to 1956-57	81.0	108.6
1956-57 to 1957-58	86.7	67.3

Source : Computed from *tur* output estimates in *Agricultural Situation in India*, Vol. VII, No. 7, October, 1952 ; Vol. IX, No. 5, August, 1954 ; Vol. XI, No. 4, July, 1956 ; Vol. XII, No. 4, July, 1957; and Vol. XIII, No. 4, July, 1958. A change in reporting occurred for Mysore in 1955-56, but comparable reports for the two affected pairs of years were used in computing the above.

Other expansions in regional coverage have also been relatively small compared to previously reported output. Nine expansions in coverage, identified from notes to output estimates reported in *Agricultural Situation in India* from 1950-51 to 1956-57, are shown in Table II. In each case it is seen that the additional coverage was less than 1 per cent of total reported output.

TABLE II—EXPANSIONS IN REGIONAL COVERAGE OF OUTPUT ESTIMATES

Year	Crop	Region	Output (tons)	All-India (tons)
1950-51	Wheat	Banares, Tehri-Garwahl, Uttar Pradesh ; Cooch Behar, West Bengal	About 25,000	6,462,000
1950-51	Sesamum	Tripura, Bilaspur	1,000	438,000
1951-52	Castorseed	Rajputana	65	101,000
1951-52	Rape-mustard	Ajmer, Madras	251	750,000
1951-52	Linseed	Ajmer, Madras	471	361,000
1952-53	Sesamum	Trichur, Travancore-Cochin	282	438,000
1951-52	Ginger	Madhya Bharat	92	14,947
1952-53	Tobacco	Bhopal	less than 500	257,000
1954-55	Chillies	Travancore-Cochin	less than 500	300,000

Source : Agricultural Situation in India, crop output estimates.

Some perspective may be given on general increase in geographical coverage as shown in the land utilization data. From 1950-51 to 1961-62 total reporting area increased by 5.1 per cent to cover 91.6 per cent of all-India.[2] Probably little of the additional reported area was crop land, however, since the increase in reported area nearly equalled the increase reported in forest land for that period, while the increase in net area sown of crop land corresponded nearly to the decrease in fallow land and other uncultivated land such as "cultivable waste." Toward the early part of this period, when 89.3 per cent of geographical area was reporting, half the non-reporting area was in Jammu-Kashmir (where 90 per cent of the State was non-reporting), a quarter in North-East Frontier Agency, about five per cent each in Manipur and Himachal, and some what over two per cent each in Hyderabad, Madhya Bharat, and Andaman-Nicobar Islands, and the remaining nearly twenty per cent in other States.[3]

From the above it appears that since the expansions in geographical coverage involved very minor portions of total output, the assumption in index-estimating procedure with respect to change in output of non-reporting regions relative to change for reporting regions had a negligible effect on comparability of the index numbers.

The link-relatives on which the index numbers are based also provide comparability for pairs of years with respect to whether estimates are based on traditional methods of reporting or random crop-cut samples. If output is 300 in year 1 estimated traditionally, and 330 in year 2 estimated likewise, but 350 when estimated by sample, the percentage increase is nonetheless taken as 10 per cent, and if year 1 index is 100, then year 2 is 110. In year 3 output may be 420 according to sample, and the index is then 132. It is assumed that the change from year 1 to year 2 would have been the same even if it had been estimated by sample.

Traditional estimates, based on the village authorities' judgment of the current crop as a percentage (or *annawari*) estimate of the "normal" crop, is believed to be conservative, so that there is "a general tendency on the part of the official crop reporters to over-estimate the production in bad seasons and under-estimate it in good seasons."[4]

If year 1 was a bad year, then, if it had been accurately reported, the actual estimate would have been lower and the percentage change from year 1 to year 2 would be greater than shown above, assuming that year 2 is a good year. Over a long period of years, however, if the traditionally-estimated component retained the same importance relative to total, there would be little or no effect on trend except for the influence of change in end years of the series.

Sample-based estimates are, in fact, becoming progressively more dominant as seen in Table III. For some crops, sampling had reached nearly 100 per cent

2. India, A Reference Annual, 1965, Ministry of Information and Broadcasting, Government of India, p. 215.

3. Special Returns from the State Governments, *Agricultural Situation in India*, Vol. X, No. 8, November, 1955, p. 617.

4. V. G. Panse, "Trend in Areas and Yields of Principal Crops in India," *Agricultural Situation in India*, Vol. VII, No. 3, June, 1952, p. 145.

TABLE III—OUTPUT ESTIMATED BY CROP-CUTTING EXPERIMENTS

(percentage)

Crop	1951-52	1958-59
Rice	60.3	89.9
Wheat	68.0	99.2
Jowar	56.8	99.8
Bajra	53.8	99.4
Barley	86.3	98.7
Maize	38.8	79.0
Ragi		86.0
Small Millets		16.9
Gram		99.1
Tur		87.8
Other pulses		34.5
Rape-mustard	5.7	21.3
Sugarcane		18.8
Cotton	17.6	51.1
Jute		72.2
Tobacco		20.3
Potato		32.2
Linseed	12.0	42.1
Sesamum		31.1
Groundnut		41.7

Source : National Income Statistics—Proposals for a Revised Series of National Income Estimates for 1955-56 to 1959-60, Central Statistical Organisation, Department of Statistics, Government of India, 1961, p. 18.

of output as early as 1958-59. To the extent that this applied to other crops also by 1964-65, the conservative bias in traditional estimates would have mainly affected early years, and would have had progressively less influence on later years. If good and bad years generally alternated in earlier years, there would be little if any effect on trend measurement, but if early years were dominantly good or bad, then trend as measured would be over-or under-estimated.

The effect of this bias is difficult to estimate because comparative statistics for traditional and sample-based estimates are not generally available and because of problems in determining whether given years would have been viewed as good

or bad in the opinion of village estimators.[5] The base year 1949-50 was judged to be normal, and in that year "official" (traditional ?) and crop-cut estimates were nearly equal ; drought characterized the next two years.[6] For all-India all-crop yield per acre, index numbers dipped below the initial 100 in the second through fourth years, and for foodgrains in the second through fifth years, indicating that they were bad years. From this it appears that conservative bias in the traditional component of estimates tended to under-estimate the rising trend of output growth.

Finally, it may be observed that to the extent that output is estimated by sample, the reported figure should be viewed as the center of a range within which actual output has a probability of being found, rather than a single-valued precise figure. Standard error for the official estimates do not appear available. In 1957, however, a goal was reported for holding standard error of foodgrains at the State level to less than two per cent for a given crop; if this has been achieved then the standard error for all-India would be much smaller and the margin of error virtually insignificant.[7] Since food crops constitute nearly 70 per cent of output, error for all-crop output would also tend to be low, but to the extent that the goal has not been reached and that non-foodgrains have larger error ranges, the trend calculated for all-crop output should also not be viewed as a single-valued precise figure.

WEIGHTS

Individual crop index numbers are combined with weights corresponding to each crop's share of total value of all index crops; the official index uses 1949-50 output value for this purpose, price as well as output having been considered normal for that year. But it has been suggested that "the question of the most suitable period for the weights might be looked into. It is difficult to single out any particular year as being normal for all commodities entering the index number. . . "[8]

The underlying criterion for choice of base period of weights is a normal structure of the crops comprising total value ; but normalcy cannot be objectively determined. Average over a period of years may be considered normal, but except when there are unusual events such as wars there is no objective means of determining how many years should be averaged. If there are unusually large changes in the aggregate over a short period, it is usually expected that there will be considerable change in structure of the components, and the changed structure is viewed as abnormal. Since weights for combining individual crop indexes are value-based, both change in price and output level must be considered with respect to normalcy. Price level in the weight base-period should, then, show

5. In preparing this paper an effort was made to determine whether and how much each year was good or bad by observing deviations from linear trend of each crop series. Comparison was made between percentage deviations of similar crops in the same year where there was noticeable difference in the traditional versus sample-based element in estimates, but the results were inconclusive.

6. "Index Numbers of Agricultural Production," *Agricultural Situation in India*, Vol. IX, No. 12, March, 1955, pp. 205-209.

7. "Food Statistics in India," *Agricultural Situation in India*, Vol. XII, No. 7, October, 1957, p. 769.

8. V. G. Panse and V. S. Menon, "Index Numbers of Agricultural Production in India," *Indian Journal of Agricultural Economics*, Vol. XVI, No. 2, April-June, 1961, p. 25.

little change. In that period output, for an expanding economy, may be expected to show change, but the change should be normal—close to that which could be expected according to trend.

Levels of agricultural prices, all-crop output and its trend, are shown in Table IV. The normalcy of 1949-50 cannot be adequately judged from these data. Output in the previous years, based on linking the official index with K. Mukerji's index,[9] was 94.8 in 1948-49 and 98.3 in 1947-48. Price of the food articles component of all-crops rose from nearly 107 in 1948-49 to about 109 in 1949-50 and about 117 in 1950-51. Year 1949-50 thus appears normal in that there was relatively little change over the previous year in price and in that although there was a moderate increase in output from 1948-49 to 1949-50, the latter year was close to trend (extrapolated from the period starting with 1949-50).

TABLE IV—AGRICULTURAL PRICE LEVEL, ALL-CROP OUTPUT INDEX AND TREND

Year	Agricultural Prices[a]	Output Index[b]	Output Trend[c]
1949-50		100.0	96.3
1950-51		95.6	99.4
1951-52	118.8	97.5	102.5
1952-53	100.0	102.0	105.8
1953-54	105.8	114.3	109.2
1954-55	94.3	117.0	112.7
1955-56	88.0	116.8	116.3
1956-57	104.5	124.3	120.0
1957-58	107.4	115.9	123.8
1958-59	114.0	133.5	127.8
1959-60	116.5	130.3	131.8
1960-61	123.8	142.2	136.0
1961-62	122.8	144.8	140.4
1962-63	123.8	137.5	144.8
1963-64	130.7	142.6	149.5
1964-65	155.0	157.6	154.2

Source: (*a*) National Council of Applied Economic Research: Price Policy and Economic Growth, Occasional Paper No. 14, 1965, p. 14 ; (*b*) Growth Rates in Agriculture ; (*c*) Computed from simple exponential trend fitted to (*b*).

9. K. Mukerji : Levels of Economic Activity and Public Expenditure in India, Asia Publishing House, Bombay, 1965, p. 123.

In the next years price is seen to decline markedly from 1951-52 to 1955-56, and then start its continuing upward climb. There was relatively little change, however, from 1958-59 to 1959-60 and from 1960-61 to 1962-63. Output in 1959-60 was not much below the previous year, nor much below trend value. These price and output conditions suggest that 1959-60 might be a good alternative for a more recent weight-base period. Another suitable year might be 1961-62, when output increase was only slightly below trend.

Unfortunately, data were not conveniently available for either 1959-60 or 1961-62. Weights were constructed on other years for which data were available : for 1949-50 and 1948-49—1950-51 from data in Final Report of the National Income Committee, 1954 ; from National Income Statistics—Proposals for a Revised Series of National Income Estimates for 1955-56 to 1959-60 for each of those years, except the last, for which data were not given, and for their average; and from Notes on Perspective of Development, India : 1960-61 to 1975-76, Planning Commission, 1964 for 1960-61. None of these weight sets are as valid as the official set because the latter are based on prices at village level, whereas the others are at wholesale price level, thereby including varying degrees of transportation and marketing cost according to the given crop. The official set is based on harvest period prices, and so too are those in National Income Statistics; Final Report prices were yearly averages. Whether harvest period gives ideal timing for these prices may be questioned; P. N. Mathur found that for jowar in Vidarbha only half the crop was sold in the first three months after harvest and the rest was held back as much as nine months until size of the next crop was indicated.[10] Weights for these years, and details of the weight construction for each source, are given in Appendix 1. It may be mentioned here, however, that for 1960-61 source data for foodgrain crops other than rice and wheat was given only for the aggregates, coarse grains and all pulses, and considerable estimation was necessary for all the individual crops involved. Consequently, the 1960-61 weights are not considered as reliable as the others.

All-India trend rates of growth for the main crop aggregates, obtained by fitting simple exponential functions to index numbers obtained with the weights described above, as well as the official rates given in Growth Rates, are presented in Table V. The striking feature shown by these rates is that there is scarcely any difference between them. Considering the arbitrary nature of the averaging process necessary to obtain all-India prices for each crop, and the disadvantages of the alternative weight sets with regard to level[11] and timing of prices, the small differences between rates obtained with the alternative weights may be taken as insignificant.

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10. P. N. Mathur, "Time-Pattern and Quanta of Purchase and Sale of Jwar by the Peasants of Vidarbha," *Artha Vijnana*, Vol. I, No. 1, March, 1959.

11. Comparing Final Report 1949-50 value per maund with price per maund used in the official index, the former, though at wholesale level, was found lower than Growth Rates' village level for rice, maize, *ragi*, sugarcane, tobacco, and chillies ; wheat was only 1 per cent higher at wholesale level, but barley, a less marketed crop, was 21 per cent higher. These differences might be explained by difference in timing, but it seems probable that they are explained by differences in averaging procedures.

TABLE V—ANNUAL TREND RATES OF OUTPUT GROWTH FOR ALL-INDIA CROP AGGREGATES : 1949-50 TO 1964-65

Weight year	Weight data source	Annual Growth Rates (per cent)		
		Foodgrains	Non-foodgrains	All-crops
1949-50	.. Growth Rates	2.98	3.61	3.19
1949-50	.. Final Report	2.92	3.76	3.22
1948-49—1950-51	.. Final Report	2.97	3.71	3.10
1955-56	.. National Income Statistics	2.95	3.67	3.19
1956-57	.. National Income Statistics	3.13	3.63	3.18
1957-58	.. National Income Statistics	2.96	3.52	3.20
1958-59	.. National Income Statistics	3.04	3.67	3.16
1955-56—1958-59	.. National Income Statistics	2.96	3.69	3.19
1960-61	.. Perspective Development	3.00	3.89	3.29

FORM OF TREND EXPRESSION

Growth Rates are expressed in two forms, "linear" and "compound." The linear form is obtained by fitting a straight line to the index numbers, finding the slope of the line, and standardizing it—reducing it to a percentage—by dividing it by the average index in the first three years. The compound rate is obtained by fitting a straight line to logarithms of the index numbers; the slope of that line gives the constant percentage rate at which the fitted line is changing. Because of the standardizing procedure used for the linear rates, they are higher than compound rates for all series which show growth; for the all-India crop aggregates linear percentage rates are higher than compound by 22.8 per cent for foodgrains, 21.6 per cent for non-foodgrains, and 22.9 per cent for all-crops. Since no preference is expressed between the two forms, it may not be surprising that official references cite the linear growth rates.[12]

The linear and compound rates would be more nearly the same if a better standardizing base was used. Choice of base period for this purpose may be considered completely arbitrary, in which case even the last period of a series of years might be used, as shown in Table VI, giving very low rates. The preferable way of standardizing the linear rate is to base it on an average of the entire series,[13] and when that is done the results are only slightly higher or lower than the compound rates, as seen also in Table VI.

12. *Agricultural Situation in India*, Vol. XIX, No. 2, May, 1964, p. 99 ; Union Food Minister's report to 1965 Conference on Agricultural Productivity, *Agricultural Situation in India*, Vol. XX, No. 3, June, 1965, pp. 137-138.

13. Ram Dayal and Radhey Shiam, "Measurement of Growth Rates of Agricultural Production," *Agricultural Situation in India*, Vol. XVIII, No. 4, July, 1963, pp. 177-181. Interestingly, Growth Rates, Appendix 3.2, shows effect of different bases on standardization, using the single year 1949-50 and the triennium 1952-53 to 1954-55, but these bases would also tend to give high rates for growth series.

TABLE VI—EFFECT ON STANDARDIZED RATES OF DIFFERENT BASE-LEVELS

(percentage)

Years of standardizing base	All-India Output		All-crops
	Foodgrains	Non-foodgrains	
1949-50—1951-52	3.66	4.39	3.92
1962-63—1964-65	2.48	2.88	2.75
1949-50—1964-65	2.87	3.54	3.26
Compound rates	2.98	3.61	3.19

There seems, however, to be no point to proliferating a growth rate study with parallel sets of rates. Linear rates are easier to compute but that would be scant justification for choosing that form rather than the simple exponential, especially since the latter avoids the arbitrary element present in choosing a standardizing base for the linear. A justifiable ground for choice is the reliability of the estimates, as indicated by the standard error; for the main all-India aggregates, standard error was lower for the linear as compared with the compound trends, for foodgrains 0.41 versus 0.60, for non-foodgrains 0.30 versus 0.48, and for all-crops 0.29 versus 0.49. For most individual crops for which standard error was given in Growth Rates, the linear trends at all-India level gave lower standard errors. The Growth Rates point of view, however, is apparently not so concerned with reliability of the estimates as such, but with satisfying the "goodness of fit" test, for which both trend forms were found highly significant for the all-India main crop aggregates. This test refers to significance of the difference between slope of the trend line for the observed data and a trend line of zero slope for the entire statistical universe from which the observations were taken. Since the test is concerned with slope of a regression line obtained from a sampling of data from a universe, and since the index numbers from which the trends are derived are rather an enumeration reflecting all districts and States, the test does not appear to have much applicability.

TIME SPANS

Since the Growth Rates trends are fitted to the entire series, a terminal year problem could exist—if end years of the series are at different stages in the cyclical variations of output, the trends would be tilted away from their proper slope because of the lack of comparability in the terminal years. As was shown above, 1949-50 was a peak year for that period, higher than either the two preceding or succeeding years. A high peak was also reached in 1964-65, as seen against previous years (Table IV) and the catastrophic following year and poor current year. Since 1949-50 and 1964-65 are both peaks, the terminal year problem does not arise.

It would be equally valid, however, in measuring trend for that period to measure between 1950-51 and 1965-66 which are both troughs, giving a food-

grains simple exponential trend rate of 2.62 per cent.[14] Since both peak-to-peak and trough-to-trough measures are equally acceptable, an average of both is preferable to either one,[15] leaving a rate of 2.80 per cent for the entire period.

Finally, there is a disadvantage in any form of trend measurement over a long period in which there are heterogeneous growth conditions, since the rate for the whole period may not reflect the typical condition for any period. In the 1949-50 to 1965-66 period there was a segment of rapid growth up to 1958-59 ; P-P (1949-50 to 1958-59) rate of 3.28 per cent and T-T (1950-51 to 1957-58) rate of 3.72 per cent averaged to 3.50 per cent (for foodgrains) in the rapid growth segment. For the remaining segment P-P (1958-59 to 1964-65) rate of 1.69 per cent and T-T (1957-58 to 1965-66) of 1.55 per cent averaged to only 1.62 per cent. Both periods may then be averaged, weighted according to the number of years in each segment, to 2.65 per cent for the entire period. In this form an average is obtained for the whole period, but the differing conditions of growth are also revealed.

CONCLUSION

It has been seen that additional geographical coverage has probably had a negligible effect on comparability of the index numbers underlying the trends. The influence of transition from traditional to sampling methods of estimation could not be measured, but probably has led to somewhat under-stating the growth. Alternative weight sets had a negligible effect on the measured rates. Use of standardized linear rates as in Growth Rates has exaggerated almost all the rates, by about twenty per cent over the simple exponential rates for the main all-India aggregates. If trough-to-trough and peak-to-peak trends were averaged for the whole period, the results would be somewhat less than the compound rates given in Growth Rates.

Finally, however, a fuller picture of trends is gotten by dividing the whole period into an early rapid-growth segment and the later slow-growth segment. When the segment trends are averaged (for foodgrains) the rate is somewhat less than when trend is measured for the entire period. In the latter form, however, built up from segment rates, the difficulty in maintaining adequate supply, with population growing at about 2.50 per cent, is more explicable. The official linear rate of 3.66 per cent for foodgrains, and even the compound rate of 2.98 per cent, conceal rather than help to explain the urgent situation which has been developing over recent years, when the population rate has clearly exceeded the foodgrain expansion rate.

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14. Foodgrain index was estimated as 122.3 for 1965-66 from data on tonnage of foodgrain output for that year as given in *India News*, September 23, 1966, p. 4; the non-foodgrain index was not available.

15. This averaging procedure was used in the author's Agricultural Trends in India, 1891-1947 : Output, Availability, and Productivity, University of Pennsylvania Press and Oxford University Press, 1966 ; three or four peak-to-peak and trough-to-trough spans were sometimes averaged for one segment.

APPENDIX 1

CROP WEIGHTS BASED ON ALTERNATIVE SOURCES

Crop	Growth Rates 1949-50	Final Report		National Income Statistics					Perspective Development 1960-61
		1949-50	1948-49 to 1950-51	1955-56	1956-57	1957-58	1958-59	1955-56 to 1958-59	
Rice ..	35.3	33.91	34.92	33.97	33.46	36.23	33.04	34.18	36.43
Jowar ..	5.0	5.69	5.80	4.79	6.51	7.00	6.03	6.08	6.57
Bajra ..	2.7	2.80	2.72	2.50	2.66	3.43	3.04	2.91	2.76
Maize ..	2.1	2.04	1.94	1.75	2.28	2.61	2.67	2.33	2.33
Ragi ..	1.2	1.23	1.16	1.19	1.37	1.48	1.29	1.33	1.23
Small millets ..	1.5	1.73	1.67	1.19	1.35	1.22	1.25	1.25	1.03
Wheat ..	8.5	8.96	9.30	10.62	9.69	8.06	10.12	9.62	8.74
Barley ..	2.0	2.45	2.44	2.34	2.21	1.45	1.99	2.00	1.73
Gram ..	3.7	3.87	4.36	4.79	5.16	3.63	6.51	5.02	5.03
Tur ..	1.1	1.95	2.07	2.00	1.91	1.35	1.75	1.75	1.57
Other pulses ..	3.8	3.93	4.11	3.81	3.11	3.02	4.02	3.49	2.90
Foodgrains ..	66.9	68.56	70.49	68.95	69.71	69.48	71.71	69.96	70.32
Groundnut ..	5.7	6.35	5.64	4.00	4.81	5.15	4.92	4.72	5.23
Sesamum ..	1.2	1.16	1.13	.88	.95	.79	.88	.88	.65
Rape-mustard ..	2.0	2.11	1.90	1.44	1.83	1.53	1.47	1.57	2.17
Linseed ..	0.8	.82	.76	.72	.50	.36	.55	.53	.49
Castorseed ..	0.2	.20	.20	.56	.50	.46	.45	.49	.11
Cotton ..	2.8	2.96	2.86	5.25	4.44	4.63	3.59	4.48	4.08
Jute ..	1.4	1.67	1.48	1.53	1.25	1.30	1.22	1.30	1.27
Mesta ..	0.3	.30	.30	.30	.30	.30	.30	.30	.35
Tea ..	3.3	.75	.76	1.66	1.58	1.80	1.47	1.63	1.51
Coffee ..	0.2	.20	.20	.41	.33	.36	.29	.35	.27
Rubber ..	0.1	.10	.10	.10	.10	.10	.10	.10	.16
Sugarcane (*gur*)	8.7	8.57	8.03	6.33	5.92	6.37	6.28	6.22	8.09
Tobacco ..	1.9	1.82	1.72	3.09	3.44	3.12	2.44	3.02	2.25
Potato ..	1.0	1.04	1.19	1.50	1.23	1.30	1.70	1.43	1.42
Pepper (black)	1.2	1.20	1.20	1.20	1.20	1.20	1.20	1.20	.20
Chillies (dry) ..	2.0	1.89	1.74	1.78	1.61	1.45	1.23	1.52	1.38
Ginger (dry) ..	0.3	.30	.30	.30	.30	.30	.30	.30	.05
Non-foodgrains	33.1	31.44	29.51	31.05	30.29	30.52	28.29	30.04	29.68

NOTES

Final Report of the National Income Committee, February, 1954, Department of Economic Affairs, Ministry of Finance, p. 36. Index crops not specifically listed in this report—rubber, mesta, coffee, castorseed, pepper, and ginger—were given the same weight in the present study as in the official Index.

National Income Statistics, Proposals for a Revised Series of National Income Estimates for 1955-56 to 1959-60, Central Statistical Organization, Department of Statistics, Government of India, 1961, p. 37. Rubber and mesta, not included, were given the same weight as in official Index.

Notes on Perspective of Development, India : 1960-61 to 1975-76. Planning Commission, Perspective Planning Division, Government of India, 1964, pp. 44-45, gives value for most crops, but value for all "coarse grains" and "all pulses" were each given without breakdown. The portion of value accrueing to each crop in these sub-groups was estimated as follows. Output of each crop (as given in India 1964, Publications Division, Ministry of Information and Broadcasting, Government of India, 1964, p. 204 was multiplied by price obtained as indicated below. The sum of these values was found to be about one per cent more than the 1960-61 figure given for all coarse grains and a half per cent more than the given for all pulses. Each of the crop output values was then scaled down by the percentage required to make the estimated and given aggregate values equal.

Prices for jowar, bajra, maize, and barley were obtained by changing the 1958-59 value per unit according to the change in Index of Harvest Prices, 1958-59—1960-61. This method, when tested on rice and wheat, for which value per unit data were available for both years, gave closer results than other alternative methods which were tried. It may be noted that the change for rice according to above sources over these two years was 8.5 per cent whereas according to the Index of Harvest Prices it was only 1.6 per cent, and according to the Index of Wholesale Prices, 2.4 per cent ; for wheat the comparable price changes were —15.06 per cent, and —22.0 per cent. For *ragi*, in the absence of harvest price index, the wholesale price index for September-December (taken as the main harvest period) was used. For small millets the price was taken as 75 per cent of the weighted average price of coarse grains, the same procedure as in National Income Statistics. For gram the Index of Wholesale Prices, January-June, was used. For *tur* and other pulses price was inferred from change in this index for gram.

For this year weights for mesta, rubber, pepper, and ginger were taken as in Growth Rates.