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AGRICULTURAL PRODUCTION AND PRODUCTIVITY  
DURING THE PLAN PERIODS

A REVIEW OF THE PAST AND SOME REFLECTIONS  
ON THE FUTURE

By

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I am most uncomfortably conscious of the poor claims I have to occupy this Chair and am grateful to you for having shown me this signal mark of your regard and esteem by inviting me to preside over this Conference. I hope you will extend the same consideration to my Presidential Address as well and forgive me for any lapses of omission or commission that I may make in this attempt to say something meaningful in the realm of agricultural economics.

As we have now completed two Five-Year Plans and have already entered on the Third, it may be useful to look at the performance of the agricultural sector during the last ten years, particularly in terms of productivity and by individual crops. The relation between the crop pattern and productivity is also worth examination. The differences that exist in inter-State productivity in agriculture also needs to be formulated. Finally, it would be useful to view the Third Plan programme for agriculture and see how far it attempts to diminish differences in inter-State productivity in agriculture.)

I am deliberately talking of productivity rather than production, not only because the former is more important in itself but also because it is bound to increase in importance with our limited supplies of cultivable land and the rising targets that are being put forward for our agricultural production. Productivity is a difficult theme, both conceptually and in terms of measurement and any definition that one adopts is bound to meet with some objection. It is important to remember however that productivity is a physical rather than a value concept and describes the changing relation between output and one of the major inputs like land or labour or capital. For purposes of statistical convenience, I propose to deal with productivity in this paper in terms of the relation between output and land or in more familiar language, the yield per acre.

In calculating the figures of yield per acre either nationally over time or by the different States at one point of time, one is confronted by the difficulty that our agricultural statistics have been constantly undergoing improvement during the last 20 years both in terms of a more complete recording of the area under cultivation and of a more accurate estimation of output by the substitution of the traditional *anna-wari* method by the more scientific one of crop-cutting experiments. As this improvement is automatically taken into account in the recorded statistics of area and production year by year,

it follows that a part of the increase or decrease as the case may be which a historical series shows is merely of a statistical character and does not reflect a corresponding change in reality. A somewhat extreme illustration of what this can mean is shown by the statistics relating to the *tur*-crop. "Thus, for the year 1949-50, the all-India production estimate stood at one million tons. From the year 1950-51, Orissa, Assam and Mysore States, which did not provide any production figures for this crop in the past, began to supply estimates. In Madhya Pradesh and Uttar Pradesh States, which are large producers of *tur*, the crop sampling method replaced the traditional method of estimating yield from the same year. The result of these changes was that the all-India production estimate of *tur* shot up to 1.69 million tons and has maintained that approximate level since." It became important therefore to devise some method by which to eliminate these purely statistical variations and build up a comparable historical series of agricultural production. This was done by the Ministry of Agriculture by adopting the ingenious device of linking up each year's production estimate for a crop with the preceding year's estimate through a second estimate strictly comparable with the latter and, by using the chain method, constructed a time series of adjusted production estimates comparable with one another over the entire series. Details are given in an article by Dr. V. G. Panse and Shri V. S. Menon on "Index Numbers of Agricultural Production in India" published in the *Indian Journal of Agricultural Economics* in their April-June 1961 issue. The same article contains such corrected estimates of the index numbers of agricultural production for the years 1949-50 to 1958-59 crop-wise, two alternative sets of figures being given, one with 1949-50 as base and the other with 1956-57 as base. The index numbers of production given in this article have been brought up to date to include 1959-60 and 1960-61 in a note published in the latest issue of the Ministry's *Agricultural Situation in India* (August, 1961).

Before one can use these figures to estimate the change in agricultural productivity or yield per acre during this period, it is necessary to have corrected figures of area, taking into account purely statistical changes that are the result of better coverage (or inclusion in acreage figures of areas which were previously non-reporting). The Ministry of Agriculture has not prepared an index of corrected area under cultivation during the period and use of the published figures of area without adjustment will tend to underestimate the increase in the yield per acre, as large increases in the area under cultivation have been recorded merely on account of better coverage.<sup>1</sup>

When one examines the figures of additions to reporting areas, however, one finds that their significance is much less after 1949-50 than before that year. In fact, I was responsible in 1944 as Director of Statistics in the Food Department of the Government of India for obtaining from all State Gov-

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1. My attention was drawn to this defect in the original version of my Presidential Address. I have taken advantage of this to do fresh work on the subject and arrive at revised figures of increase in productivity or yield per acre, after allowing for purely statistical increases in the figures of the area under cultivation during this period. This paper contains the revised data, which supersedes the original Table-1 in the Presidential Address as delivered at Pilani. It will be seen from the text however that the difference this makes is not as significant as may have been expected. This is mainly because of the fact that the bulk of the statistical increase in area coverage had been completed by 1949-50, due to exclusion of Pakistan occupied areas of Jammu & Kashmir State.

ernments *ad hoc* estimates of food production in non-reporting areas during 1944-45 and these were published by Government in 1945 in a special publication entitled *Food Statistics in India*. Subsequently, the Governments were asked to prepare regularly estimates for these non-reporting areas on an annual basis. Since then some improvement in the method of estimation of crop acreages was made in areas which were either not cadastrally surveyed or where regular land records were not obtained, and this process still continues.

Data on new reporting areas is available only till 1956-57, and these have been included in the published figures of area under cultivation, thus introducing difficulties of comparability till 1956-57. Figures of 1957-58 and after do not include any new reporting areas and thus do not present difficulties of comparability from 1956-57. The following statement gives the figures of additions to reporting areas from 1947-48 :

#### ADDITIONS TO REPORTING AREAS

(in millions of acres)					
1947-48	...	20.0	1952-53	...	7.3
1948-49	...	4.2	1953-54	...	0.7
1949-50	...	91.0	1954-55	...	0.2
1950-51	...	22.0	1955-56	...	0.5
1951-52	...	0.7	1956-57	...	1.0

Thus the bulk of the additions to reporting areas or the purely statistical increase in area statistics had been completed before the beginning of the First Five-Year Plan in 1951-52, additions between 1952-53 and 1956-57 accounting for only 1.2 per cent of the total geographical area. Moreover, it must be remembered that the addition that this makes to the total area under cultivation is much smaller than the increase in the reporting area and is only of the order of 4 to 4.5 million acres. Thus, figures of area during the Plan period are not vitiated to any significant extent by the inclusion of new reporting areas, and the bulk of the increase during this period can be legitimately regarded as non-statistical or real and therefore admitting of comparability. Nevertheless, I have made the necessary adjustments in the area figures, as the figures I am using for estimating the increase in productivity are based on three-year averages for each year of the Plan period, the average used for each year including the data for the previous two years. Thus the average figure used for 1951-52 includes the data for 1949-50 and 1950-51; and as significant increase in reporting areas took place during these two years, adjustment has to be made on this account. Moreover, significant increase in reporting areas also took place in 1952-53 and these also had to be taken into account in calculating the adjusted figures for 1949-50, 1950-51 and 1951-52. It may be added that the total cultivated area thus covered was of the order of about 11 million acres, and it was shared between Rajasthan and Saurashtra in terms of States, and *jowar*, *bajra*, other millets, gram, other pulses, groundnut, sesame and cotton in terms of individual crops.

I have made use of the adjusted data to derive figures of the corrected increase in the yield per acre during the first two Plan periods. I have taken the corrected index numbers of area and production for the years 1949-50 to 1951-52, and of 1958-59 to 1960-61, in each case taking a three years' average to make

some allowance for the seasonal factor. Taking the average of the three years ending with 1960-61 as a percentage of that of the three years ending with 1951-52, I arrive at the following figures of the increase in area, yield per acre, and production which has taken place in different crops on a national basis during the ten years of the first two Plan periods.

TABLE I—PERCENTAGE INCREASE IN AREA, YIELD PER ACRE AND PRODUCTION IN 1958-59|1960-61 OVER 1949-50|1951-52

Crop	Area	Yield	Production
Rice	9.8	27.4	36.9
Jowar	6.8	23.3	31.7
Bajra	8.1	18.6	28.2
Maize	31.9	11.8	47.5
Ragi	9.9	23.8	36.1
Small Millets	-1.4	12.1	10.5
Wheat	32.1	17.8	55.6
Barley	4.2	7.9	12.4
Gram	30.7	29.5	69.3
Uar	3.8	-5.7	-2.1
Other Pulses	19.5	-7.8	10.0
Groundnut	25.5	12.1	40.7
Sesamum	-9.0	4.6	-4.8
Rape and Mustard	27.9	8.8	39.1
Linseed	21.7	-3.8	17.1
Castor	-7.9	14.0	-6.4
Cotton	30.1	20.7	57.0
Jute	11.0	6.4	18.1
Mesta	60.5	15.6	85.1
Sugarcane	24.7	9.1	36.0
Tobacco	14.0	-2.9	10.7
Potato	40.2	10.6	55.0
Pepper (black)	17.2	5.0	23.3
Chillies (dry)	7.7	-2.4	5.1
Ginger (dry)	-13.6	19.3	1.8
All Crops	15.0	18.6	36.4

You will see from the table that it also contains an aggregate estimate for all crops taken together. This is based on the figures worked out by the Directorate of Economics and Statistics of the Ministry as a fixed base quantity index, based on gross production of the 28 crops listed in the table,<sup>2</sup> with farm-harvest prices prevalent during the year 1949-50 employed as weight. It shows that while agricultural production as a whole has increased by 36.4 per cent during this period, the increase in the average yield per acre is only 18.6 per cent, the rest of the increase in production being accounted for by increase in the area under cultivation. It is also seen from the table that the largest increases in yield per acre has taken place in the case of foodgrains—gram 29.5 per cent, rice 27.4 per cent, ragi 23.8 per cent, jowar 23.3 per cent, bajra 18.6 per cent, wheat 17.8 per cent, and maize 11.8 per cent—and of the fibres—cotton 20.7 per cent, mesta 15.6 per cent, and jute 6.4 per cent—while in the case of the oilseeds, the increase in yield per acre has been low and is actually negative in the case of linseed. There has also been a noticeable fall in the

<sup>2</sup> In addition to the 25 crops listed in the table, the index also includes tea, coffee and rubber.

yield per acre in the case of pulses other than gram, *tur* showing a fall of 5.7 per cent and other pulses of 7.8 per cent. It will also be seen that percentage increase in the yield per acre crop-wise ranged from +29.5 to -7.8 for the 25 crops listed in the table, only 6 of the crops showing an increase higher than the average for all crops taken together, and as many as 11 crops having an increase of less than half of the general average. I suggest that these inter-crop variations in productivity are deserving of more adequate examination than they appear to have received so far either at the hands of Government or of non-official agencies or individuals.

It is of course true that the yield per acre is bound to be different for different crops and cannot lend itself easily to inter-crop comparability merely in terms of physical output. Lower volume of output with a higher value per unit may mean a higher productivity per acre than a larger volume of output with a lower value per unit of output. When, however, both value and volume are low per acre, productivity is certainly lower. And it is a matter of deep concern to a country if its farmers have a crop pattern that favours crops with a low yield per acre without a compensating high value per unit. That this is so with regard to India is a fact long known to students of Indian agriculture and its economics. Thus, *e.g.*, while rice, wheat, maize and barley all have yields above 700 lbs. per acre, which is low enough in all conscience, and *ragi* has a yield fairly close to 700 lbs. *jowar* has an average yield per acre which is 35 per cent less, while in the case of *bajra*, the yield per acre is 60 per cent less. Taken together, their yield per acre is barely 400 lbs. These two crops occupy about 19 per cent of the cultivated area or nearly a third of the entire area under cereals and they recorded an increase of more than 5 million acres in the area under their cultivation in the last year of the Second Plan as compared to that in the year preceding the First Plan. This persistence, and in fact even expansion of crops with both low yield per acre and low value per unit of output is a matter for disquiet from the point of view of improvement in agricultural productivity. Whether this is due to technical factors beyond human control that do not admit of the desired change in the crop pattern or whether changes in crop pattern inhibited by marketing habits on the part of the cultivator, not only with regard to sale but also purchases of foodgrains or whether it is the result of failure to effect the required change in the pattern and volume of agricultural inputs are all matters that more properly belong to the field of agronomy rather than economics. All the same, the attention paid to the question of either altering the crop pattern or otherwise increasing the yield per acre by improving the quality of these low-yield crops does not seem to be adequate to a layman like myself.\* With the increasing demands that economic development makes on our soil, it seems to me that this is a subject that calls for more immediate and more intensive examination than it has received so far.

I would also like to dispel any illusion of complacency that may have been caused by the fact that our agricultural production has recorded an increase of more than 36 per cent during the two Plan periods or an average of 3.6 per cent a year. I have already shown that about half of this increase is due to an extension of the area under cultivation a factor that is not likely to be available during the Third Plan period and certainly not during subsequent Plan periods. Increase in productivity or the yield per-acre, which is the only solid and enduring base for the required progress in our agricultural production is only 18.6 per cent over the period or an average of 1.9 per cent a year.

\* It must be admitted, however, that a part of the preference for *Jowar* and *Bajra* in spite of low grain yield would be their high yields in stalks and

It may be of some interest in this connection not only to draw attention to the much higher absolute yields per acre in Europe, North America, Japan and certain other countries, but also to the fact that the yield per acre in these areas has also been increasing and, in the case of some crops, at a much faster rate than in India during this period, even though these other countries had the statistical disadvantage of starting from much higher initial levels. By way of illustration, I would like to give you the following figures. In the North American continent, the annual yield per acre during the 3 years 1957-58 to 1959-60 has risen over that during the 5 years 1948-49 to 1952-53 by 23.8 per cent in the case of wheat, 27.8 per cent in the case of barley, 59.7 per cent in the case of maize, 33.8 per cent in the case of millet, and 41.2 per cent in the case of sorgham, which corresponds to our *jowar*. In the case of Japan, yield per acre per year during this period has risen by 19.4 per cent for wheat, 51.4 per cent for maize, 11.6 per cent for barley, and 15 per cent for rice. During the same period, Burma has recorded a rise of 60.7 per cent in the case of millets, Taiwan of 89.7 per cent in wheat, 34.7 per cent in barley, and 23.2 per cent in millets, and Thailand of 64.8 per cent in maize. In the case of Europe, the corresponding figures of increase have been 23.8 per cent for wheat, 27.8 per cent for barley, 59.7 per cent for maize, 33.8 per cent for millets, and 41.2 per cent for sorgham. Figures for India of a comparable character as given in international statistics are 9.1 per cent for wheat, 4.0 per cent for barley, 20.2 per cent for maize, 8.1 per cent for millets, 23.9 per cent for sorgham, and 18 per cent for rice. The only major country with whose figures of the rise in yield per acre India shows at an advantage is Pakistan in whose case the corresponding figures are 4.1 per cent for maize, 5.4 per cent for millets, and minus 8.2 per cent for wheat and minus 3 per cent for barley.

I do not think that we should feel happy or satisfied with our better performance as compared to Pakistan. What is more important is to feel disturbed at our comparatively slower progress, despite our Plans, in the country's agricultural productivity. We should also feel disturbed at our much lower level of productivity in absolute terms in regard to practically all our crops. Here again I feel that the time is now ripe for a complete re-examination of the whole problem of productivity in Indian agriculture not only in terms of inter-crop differences, but also in terms of absolute levels of productivity as also the insufficient degree of increase during the two Plan periods.

I would now like to turn briefly to the changes, if any, that have taken place in the crop pattern during this period. To minimize the influence of the seasonal factor, it would be better to take triennial averages for the first year of the First Plan and the final year of the Second Plan rather than annual figures. Table II gives the relevant figures.

It will be seen from Table II that the highest percentage increases in acreage were recorded by mesta, potato, wheat, maize, gram, cotton, rape and mustard, groundnut and sugarcane. The lowest percentage increases were recorded by *tur*, barley, rice, *ragi*, *jowar* and *bajra*. Linseed and sesamum actually showed a decline. The disquieting feature revealed by the table is the lower percentage rise of the area under rice. It is, however, encouraging that the low yield cereals like *jowar* and *bajra* showed a comparatively low percentage rise in cultivated area but the increase itself is not a matter for satisfaction.



TABLE II—AREA UNDER CULTIVATION—ALL-INDIA FIGURES  
(Figures in thousand acres)

Crop	Annual Average of Three Years 1949-50 to 1951- 1952	Annual Average of Three Years 1958-59 to 1960-61	Rise in Acreage	Percentage Rise in Acreage
Rice	75,106	82,534	7,428	9.9
<i>Jowar</i>	39,561	42,283	2,722	6.9
<i>Bajra</i>	25,524	27,604	2,080	8.1
Maize	8,067	10,640	2,573	31.9
<i>Ragi</i>	5,435	5,972	537	9.9
Small Millets	12,522	12,361	-161	-1.3
Wheat	24,083	31,811	7,728	32.1
Barley	7,838	8,168	330	4.2
Gram	18,802	24,573	5,771	30.7
<i>Tur</i>	5,664	5,883	219	3.9
Other Pulses	23,959	28,608	4,649	19.4
Groundnut	11,934	14,965	3,031	25.4
Sesamum	5,782	5,260	-522	-9.0
Rape and Mustard	5,325	6,812	1,487	27.9
Linseed	3,563	4,334	771	21.6
Castor	1,422	1,169	-253	-17.8
Cotton	14,798	19,234	4,436	30.0
Jute	1,508	1,675	167	11.1
<i>Mesta</i>	462	741	279	60.4
Sugarcane	4,211	5,252	1,041	24.7
Tobacco	819	933	114	13.9
Potato	615	862	247	40.2
Pepper (black)	198	232	34	17.2
Chillies (dry)	1,373	1,478	105	7.6
Ginger (dry)	47	40	-7	-14.9
All Crops	298,618	343,426	44,808	15.0

The crop pattern as such in the sense of the percentage distribution of the total cultivated area under different crops does not show much significant variation over the period. The major crops which have increased their share in the total cultivated area are wheat (1.2 per cent), cotton (0.64 per cent), groundnut (0.36 per cent) and gram (0.86 per cent) while those that show a decline are rice (-1.12 per cent), *jowar* (-0.94 per cent), *bajra* (-0.51 per cent) and barley. Details are given in Table III.

On the whole, it can be stated that the crop pattern has changed in the right direction in so far as it has increased the share of the higher yielding crops with one significant exception, namely, rice. And it appears that one of the factors contributing to increased agricultural productivity during this period has been this change in the crop pattern. Changes in the crop pattern, however, need to be studied in more detail and by regions and sub-regions with reference to both technical and economic factors, if proper relationship is to be established between changes in crop pattern and changes in agricultural productivity.

An even more important aspect of agricultural production during the ten-year period is the change, if any, that has taken place in the comparative position of the different States in the Union. An oft-repeated consideration in economic planning in the case of a large country like India is the need for balanced regional development, and the minimization of differences in respective inter-State economic levels. Too often the factor to which one turns

TABLE III—PERCENTAGE DISTRIBUTION OF TOTAL CULTIVATED AREA BY DIFFERENT CROPS <sup>a</sup>

Crop (1)	1951-52 (2)	1960-61 (3)	Difference (Col. 3—Col 2) (4)
Rice	25.15	24.03	— 1.12
Jowar	13.25	12.31	— 0.94
Bajra	8.55	8.04	— 0.51
Maize	2.70	3.10	+ 0.40
Ragi	1.82	1.74	— 0.08
Small Millets	4.19	3.60	— 0.59
Wheat	8.06	9.26	+ 1.20
Barley	2.62	2.38	— 0.24
Gram	6.30	7.16	+ 0.86
Tur	1.90	1.71	— 0.19
Other Pulses	8.02	8.33	+ 0.31
Groundnut	4.00	4.36	+ 0.36
Sesamum	1.94	1.53	— 0.41
Rape and Mustard	1.78	1.98	+ 0.20
Linseed	1.19	1.26	+ 0.07
Castor	0.48	0.34	— 0.14
Cotton	4.96	5.60	+ 0.64
Jute	0.50	0.49	— 0.01
Mesta	0.15	0.22	+ 0.07
Sugarcane	1.41	1.53	+ 0.12
Tobacco	0.27	0.27	0.00
Potato	0.21	0.25	+ 0.04
Pepper (black)	0.07	0.07	0.00
Chillies (dry)	0.46	0.43	— 0.03
Ginger (dry)	0.02	0.01	— 0.01
All Crops	100.00	100.00	

for redress of regional inequalities is industry; and even when one turns to agriculture, one does not take an overall comprehensive view of differences in agricultural productivity and yields per acre. And yet, agriculture is the largest single determinant of State levels of income except perhaps in one or two States like Bombay and Bengal that claim such a large share of India's organized industry. Differences in agricultural productivity constitute the largest single reason for differences in inter-State economic levels, and it is high time that we looked at Indian agriculture not only from the overall Indian angle but also from the individual State angles.

Inter-State comparisons in improvement in productivity during the Plan period is, however, not possible in the absence of adjustment of the figures of area and production for changes in size of reporting areas and methods of estimation of crop yields. Adjusted figures of production are not available for the majority of Indian States. It is therefore somewhat risky to attempt conclusions on comparisons of inter-State progress in agricultural production on the basis of published data. I may perhaps illustrate this by referring to one or two glaring examples of the difference that is made to production data in some States by the application of improved methods of crop estimation and more complete coverage of area under cultivation. Thus, in the case of Andhra, the traditional method of estimation was replaced by crop sampling

3. The percentages are calculated on the basis of triennial averages, *i.e.*, annual average of 949-50 to 1951-52 for col. 2 and that of 1958-59 to 1960-61 for col. 3.

for rice, *jowar*, *bajra* and maize in 1952-53, for *ragi* in 1955-56, for sugarcane in 1956-57, and for oilseeds in 1959-60; this was for the Telangana region, while in Andhra region, improvement in estimated yield was effected in later years. The result was a significant element of exaggeration in the recorded figures of production as an index of increase in agricultural productivity during the period, this being particularly so in regard to rice, *jowar*, maize and groundnut. Old Bombay (*i.e.*, Maharashtra and Gujarat) and Madhya Pradesh show even larger variations between adjusted and unadjusted yield partly because of the larger number of crops to which improved methods of estimation were applied during the period and partly because of the different years during which this was done to their component regions, while the largest differences are found in the case of Rajasthan where improved methods of estimation were applied practically to every crop during this period. Large differences are also noticeable in the case of the Punjab, U.P., Bengal and Bihar show the least differences, improved methods of estimation having been effected in their case before the advent of the Plan period.

It is very difficult to work out figures of adjusted production by States in the absence of the kind of data that can be available only to the Ministry. Nevertheless, I have attempted a heroic exercise in perhaps what may be called guesswork—I hope intelligent guesswork—by attempting to work out figures of adjusted production by States for their different crops. The difficulties in doing this are many and complex, and some may be mentioned briefly here. One is the different years in which the improved estimation is applied for the same crop in the different regions of what are now reconstituted States. Another is that of linking up improvement effected in later years of the period with the unadjusted figures of its earlier years in view of the differences made by the seasonal factor and a possible secular trend in productivity. I have tried to deal with the seasonal factor by taking the annual average of a three-year period following the introduction of improved estimation and that immediately preceding it. But for the genuine increase in productivity that may have taken place during the period, I have had to make arbitrary assumptions and take recourse to value judgments that cannot stand any close scrutiny. With all these limitations, however, the results arrived at are extremely interesting and certainly make for some revision in the estimates of comparison of inter-State progress in agricultural production during the ten years of the two Plan periods. Thus, for example, Rajasthan and Madhya Pradesh have certainly not done as well in agricultural progress over this period as may appear from an uncritical acceptance of the published figures of their agricultural production; and the same is true in varying degrees of Andhra, Maharashtra and Gujarat (the Bombay of 1957), Punjab and Orissa. I have, however, not ventured to use in this address the results of this period, and possibly foolhardy, exercise in adjustment of the change in yields per acre for different crops by the different States and do not therefore say anything about the trends in inter-State productivity in agriculture.

There is, however, no reason why we should not deal with current position in regard to differences in inter-State productivity by different crops. If we take the latest available data for the States, namely, around average of the three years ending with 1960-61, they are least likely to suffer from merely statistical increases in area and output, as, by 1958-59, better coverage of area and better estimating of output had been completed in all the States for most of the crops dealt with in this paper. Relevant figures are given in Table IV.

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TABLE IV—ANNUAL YIELD PER ACRE IN LBS. FOR THE PERIOD 1958-59 TO 1960-61

	Rice	Wheat	Jowar	Bajra	Ragi	Maize	Barley	Gram	All Food-grains	Sugarcane	Ground-nut	Total Oilseeds	Cotton	Tobacco
Andhra	1130		471	445	730	671			641		702	518	57	692
Assam	850								824					
Bihar	747	554			473	680	440	402	615	3344		272		
Maharashtra & Gujarat	850	465	456	266	700	840		299	561	6534	579	509	86	554
Kerala									1137					
Madhya Pradesh	731	619	585			824	742	543	566		600	318	71	
Madras	1323		682	543	863				954		1081	955	136	
Mysore			350	200	659				464		539	484	67	499
Orissa	627				393				594			274		
Punjab		978		286		1024	755	716	738	3295			217	
Rajasthan		792	268	196		830	1020	550	392				210	
U.P.	616	787	571	441		629	741	574	669	2541		448		698
West Bengal	925								845			292		
All India	850	715	455	282	663	771	737	565	606	3330	671	456	94	645

The data are given only for those States which have 4 per cent or more of the all-India acreage under each crop. It is seen from the table that in the case of rice, the yield per acre is well below the national average in the case of four States with more than 10 per cent of the all-India acreage, viz., Bihar, Madhya Pradesh, U.P. and Orissa. Orissa and U.P. which between them have 23.6 per cent of the all-India acreage have a yield per acre which is less than 73 per cent of the national average and less than half of the yield per acre in Madras. In the case of wheat, Maharashtra and Gujarat with nearly 11 per cent of the national acreage has an yield which is 35 per cent less than the national average. In the case of jowar, Mysore and Rajasthan have yields well below the national average with nearly 20 per cent of the acreage between them. As for bajra, this is true of Mysore and Rajasthan, with 38 per cent of the acreage between them. For maize, U.P. has an yield well below the national average, though it is the largest single State under that crop (26.4 per cent). Bihar occupies a similar position with respect to barley, though occupying the third place in area with an acreage of only 10.6 per cent, while with regard to ragi, yields well below the national average are shown both by Bihar and Orissa. Taking foodgrains as a whole, the differences in yield are startling. Madras, Kerala, Bengal and Assam stand well above the national average, with Punjab trailing at some distance; U.P., Andhra, Bihar and Orissa are about the national average, while Madhya Pradesh, Maharashtra and Gujarat, Mysore and Rajasthan are all below the average. In the case of sugarcane, it is well known that yields in U.P. are well below the national average, even though it accounts for nearly 60 per cent of the acreage. The highest place in term of yield per acre is occupied by Madras for 5 crops out of the 7 for which it is listed in the table, with the second place for the remaining crop. Punjab occupies the highest place for 4 out of the 7 crops for which it is listed in the table, with the second place for one of the remaining crops. Thus, both north and south lead in agricultural productivity. All these differences in inter-State productivity cannot be explained merely in terms of natural factors. Capital, labour and agricultural practices must have something to do with these differences; and it is high time that the whole question gets the benefit of an authoritative and comprehensive

examination, mainly with a view to determining an agricultural policy designed to reduce inter-State differences in agricultural yield and at the same time maximize the national yields per acre.

What I have said above gains added importance when we remember that the States with the highest agricultural productivity, *viz.*, Madras, Punjab and Kerala account between them for only 11.4 per cent of the total area under cultivation, while the States with the largest area under cultivation like Maharashtra and Gujarat (18 per cent), Madhya Pradesh (12.7 per cent), Rajasthan (8.8 per cent), Bihar (7.8 per cent) and Mysore (6.6 per cent)—all fare rather badly in terms of their agricultural productivity. If, as is quite certain, the future of agricultural production in India is going to turn on increase in productivity, it follows that maximum attempts should be made to raise the yield per acre in these States, thereby not only making the most effective contribution to increasing the national average, but also in the process, minimizing inter-State differences in levels of agricultural productivity.

I may now turn in conclusion to a few observations on the future. The Third Plan contemplates an increase in agricultural production on the order of 30 per cent, as against an increase of 36 per cent during the ten years preceding it. Projections made in the Third Plan report appear to contemplate a rise of another 25 per cent during the Fourth Plan period, so that over the decade 1961-70, an increase of about 60 per cent is contemplated in agricultural production. This means that, broadly speaking, it is hoped to step up the increase in agricultural production during the ten years covering the Third and Fourth Plan periods to about twice the rate achieved during the ten years covered by the First and Second Plan periods. This must be further interpreted in the light of the fact that whereas nearly half of the increase in agricultural production during the ten years ending with 1960-61 was the result of an increase in the area under cultivation, it would be very unwise to expect a similar situation in the ten years following 1960-61. In fact, we are practically reaching the limits of extensive cultivation in India; and the scope that remains for increasing output by increasing the area under cultivation is only marginal. The main brunt of the task of increasing agricultural production and reaching the Plan targets in the future is bound to fall therefore on increased productivity. Increasing the yield per acre by about 50 to 60 per cent on an average in the next ten years is the supreme task that confronts the agricultural planner in this country. The Third Plan lists in some detail the steps it contemplates for increasing agricultural production by about 30 per cent in the next 5 years; and, for the first time, details are given by States for more than irrigation.

It is a matter for some satisfaction that an attempt is being made during the Third Plan period to minimize some of the existing differences in productivity potential among the different States. This is seen especially in regard to the programme of extending the area under improved seed, where the proportion of cultivated area sought to be covered is practically the same in all the States. This is well illustrated from Table V compiled from the Third Plan report.

An attempt has also been made in the same direction, though to a much smaller extent, in regard to the programme for extending the area under irrigation. Table VI gives the relevant figures.

TABLE V—THIRD PLAN PROGRAMME FOR EXTENDING AREA UNDER IMPROVED SEED  
(in thousand acres)

State	Area in 1960-61	Area under Improved Seed			
		1960-61	Percentage	1965-66	Percentage
Andhra	21,091	1,230	5.8	12,780	60.6
Assam	4,553	438	9.6	3,000	65.9
Bihar	25,002	2,618	10.5	11,800	47.2
Maharashtra & Gujarat	41,467	3,678	8.9	17,563	42.4
Kerala	2,064	500	24.2	1,200	58.1
Madhya Pradesh	37,258	6,300	16.9	15,298	41.0
Madras	12,152	7,250	59.7	9,450	77.8
Mysore	17,321	4,869	28.1	8,876	51.2
Orissa	10,976	1,200	10.9	6,200	56.5
Punjab	17,863	3,000	16.8	9,000	50.4
Rajasthan	27,136	4,140	15.2	17,000	63.0
U.P.	45,215	18,961	41.9	29,301	64.8
West Bengal	13,685	1,000	7.3	6,000	43.8
All India	279,613	55,441	19.8	148,253	53.1

TABLE VI—IRRIGATION FACTOR BY STATES

State	Percentage of Area Sown (1960-61)	Percentage of Area Irrigated (1956-57)	Col. 3 expressed as a percentage of Col. 2	Percentage of Area to be Irrigated under Third Plan	Col. 5 as percen- tage of Col. 2
1	2	3	4	5	6
Andhra	7.6	12.7	167	11.7	154
Assam	1.6	2.8	175	1.8	113
Bihar	7.8	7.9	101	12.0	154
Maharashtra & Gujarat	18.0	6.5	36	15.0	83
Kerala	0.6	1.5	250	1.2	200
Madhya Pradesh	12.7	3.7	29	6.1	48
Madras	4.7	9.9	211	3.2	68
Mysore	6.6	3.3	50	4.1	62
Orissa	3.4	4.3	127	4.8	141
Punjab	6.1	13.4	203	9.1	149
Rajasthan	8.8	6.3	72	6.4	73
U.P.	16.5	20.5	124	16.0	97
West Bengal	4.4	5.4	123	7.0	159
All India	100.0	100.0	100.0	100.0	100

Thus, it will be seen from the table that the shares of Maharashtra and Gujarat in the irrigation programme under the Third Plan is 15 per cent as against its existing share of irrigated area in the country as a whole of only 6.5 per cent. Similarly, in the case of Madhya Pradesh, the figures are 6.1 per cent and 3.7 per cent respectively. On the other hand, the share allotted to Madras under the Third Plan programme is only 3.2 per cent as against its existing share in the national irrigated area of 9.9 per cent. Similarly, the corresponding figures for Punjab are 9.1 per cent and 13.4 per cent, and for U.P. 16.0 per cent and 20.5 per cent respectively. While this is an attempt in the right direction, the fact still remains that there is wide variation between the different States in regard to the area under irrigation and that the States with the largest area under cultivation with the exception of Uttar Pradesh are the very ones with the least area under irrigation. No doubt, this is the result of natural factors as far as major or even medium irrigation works are concerned. But this difficulty should not be equally great in the case of minor

irrigation works, and more imaginative and more vigorous planning is required to extend the area under minor irrigation, including tube-wells, and storage of rain water by tanks not only for increasing agricultural productivity but also for minimizing inter-State differences.

The programme contemplated for fertilizer distribution also takes into account the need for some correspondence between area cultivated and amount sought to be distributed, with the exception of Madhya Pradesh and Rajasthan that do not fare so well in the distribution. Details are given in Table VII.

TABLE VII—CHEMICAL FERTILIZERS: STATE SHARES (BY PERCENTAGES)

State	Percentage of Area under Cultivation 1960-61	Ammonium Sulphate		Superphosphate		Muriate of Potash	
		1960-1961	1965-1966	1960-1961	1965-1966	1960-1961	1965-1966
		Andhra	7.6	21.3	10.0	22.3	14.3
Assam	1.6	0.8	1.1	1.2	1.0	—	—
Bihar	7.8	3.9	7.6	3.7	4.9	4.3	7.2
Maharashtra & Gujarat	18.0	15.2	16.8	25.0	17.0	—	4.7
Kerala	0.6	2.9	3.6	1.7	7.8	4.3	20.1
Madhya Pradesh	12.7	2.0	3.8	1.2	1.6	—	—
Madras	4.7	11.7	11.1	14.8	13.1	52.2	32.4
Mysore	6.6	6.8	5.7	4.9	13.1	—	4.0
Orissa	3.4	2.3	3.8	2.0	2.0	—	0.8
Punjab	6.1	3.1	5.3	0.5	1.0	—	—
Rajaschan	8.8	1.2	1.9	1.0	1.3	—	—
U.P.	16.5	23.2	18.9	14.8	12.3	34.6	28.8
West Bengal	4.4	3.1	9.5	6.2	10.2	—	—
All India	100.0	100.0	100.0	100.0	100.0	100.0	100.0

In spite of the attempt to take into account regional considerations in regard to the programme of improved seed, irrigation and fertilizers, the fact remains that the comparative position of the different States is not likely to be substantially altered at the end of the Third Plan period as compared to its beginning. This is particularly so in the case of foodgrains, as can be seen from Table VIII.

TABLE VIII—PRODUCTION OF FOODGRAINS AT THE BEGINNING AND END OF THE THIRD PLAN PERIOD (BY PERCENTAGES)

State	1960-61	Addition during Third Plan	1965-66
Andhra	8.3	10.2	8.7
Assam	2.3	1.8	2.2
Bihar	8.1	8.6	8.2
Maharashtra & Gujarat	10.9	10.9	10.9
Kerala	1.4	1.3	1.4
Madhya Pradesh	11.8	7.1	10.7
Madras	6.7	7.0	6.8
Mysore	5.0	4.3	4.8
Orissa	5.2	6.8	5.6
Punjab	7.8	7.8	7.8
Rajasthan	6.5	6.8	6.6
U.P.	17.6	20.1	18.2
West Bengal	6.8	6.1	6.6
All India	100.0	100.0	100.0

In fact, the table shows that Madhya Pradesh and Mysore will be contributing a smaller share of national food production, while U.P., Andhra and Orissa are expected to record a significant increase. The differences in the case of the other States are marginal. In view of the existing differences in inter-State yields per acre, this means that not much will be done during the Third Plan period to minimize these differences; and that is not a satisfactory conclusion from the point of view of balanced regional development, which is an accepted principle of Indian planning.

I am also not certain in my mind that the investment contemplated in agriculture during the Third Plan period would be sufficient to bring about the desired increase in agricultural production in view of the fact that there is no longer much scope for increasing the area under cultivation. I am even less sure in my mind that the investment in agriculture contemplated for the different States does adequate justice to the principle of balanced regional development and the need for minimizing a part at least of the startling differences that now exist in inter-State agricultural productivity. Above all, I am convinced that the size of the targets contemplated during the Third and Fourth Plans, and, even more, that which will be necessary during subsequent Plan periods, cannot be achieved merely by attention to investment. Agricultural practices must improve beyond measure and the whole country brought up to levels which now prevail in some of its best agricultural areas. The human factor needs far more attention than it has received so far in Indian agriculture, in spite of Community Development programmes and village *Panchayats*. Land reforms have presented a sad story during the first ten years of planning; adult literacy is unconscionably low in the rural areas, and the scientific temper and technological outlook, about which the Prime Minister talks so much, has still to permeate the countryside. The man behind the plough still remains a neglected figure as far as motivation, outlook and training for increased production are concerned. The problem is so serious that I would in all humility, suggest that the time has now come—in fact it is already with us—for an authoritative and thorough examination of the entire problem of Indian agriculture. Such an examination should concentrate on the problem of agricultural productivity, the task of balanced regional development and minimization of inter-State inequalities, and the vitalizing and modernizing of the man behind the plough in India. Nearly thirty-five years ago, an agricultural-minded Viceroy appointed a Royal Commission on Indian Agriculture. Would it be too much to hope that the peasant-conscious President of the Indian Republic will appoint another Commission on Indian agriculture before he steps out of his presidential office!