

GROWTH AND IMBALANCES IN INDIAN AGRICULTURE^{1*}

DHARM NARAIN

Chairman, Agricultural Prices Commission, New Delhi

The induction of the new technology in Indian agriculture in recent years has initiated a process of qualitative transformation importantly characterised by changes in the outlook and attitudes of the farming community. And indeed in one segment, the production of wheat, a veritable revolution has occurred. The growth of wheat output at a compound rate of nearly 14 per cent per annum since 1964-65—the year of peak production immediately preceding the launching of the High-Yield Varieties Programme—through 1970-71 constitutes truly an outstanding achievement. Even more impressive, the per hectare yield of this cereal has increased over the same period at a compound rate of 7.5 per cent per annum. This development provides a window on the promise of the new technology. But if its realisation is to be measured—though this is not the only way of measuring it—by the improvement in the growth rate of total food-grain output, and even more in that of the agricultural output as a whole, over that achieved between 1949-50 and 1964-65, the promise has yet to be realised. It could, of course, be argued that a more meaningful test here would be the improvement in the growth rates for per hectare productivity. But even by this test, if we exclude wheat, the picture is hardly flattering.

In this sense, the quantitative manifestations of the qualitative changes currently underway in the growth rates not of specific segments but of totalities are still limited. After all, even with the bumper harvest of 1970-71 the growth rate of total foodgrain output at 2.9 per cent per annum since 1949-50 through 1970-71 is no higher than that, at 3 per cent per annum, realised during the period

*Technical Address delivered at the Silver Jubilee and the Twenty-fifth Annual General Meeting of the Indian Society of Agricultural Statistics, from March 24 to 27, 1972, at New Delhi.

1949-50 to 1964-65. And if the focus be extended to include cash crops, for which the growth rate for the respective periods shows a significant decline from 3.6 to 3 per cent per annum, the overall growth rate of agricultural output is seen to drop from 3.2 to 2.9 per cent per annum. This is giving rise to a major imbalance between the foodgrain and the non-foodgrain components of agricultural production but to this we shall revert later. Meanwhile, it deserves to be emphasized that even the maintenance of the growth rate of foodgrain output at around 3 per cent per annum over a span of two decades is no mean achievement. Nor indeed does it imply a denial of the contribution of the new technology but for which the growth rate would have even decelerated. The question, however, is whether this growth rate is adequate.

Adequacy of a rate of growth of foodgrain output is a relative matter, related to the income-employment goals we set ourselves to achieve. If per capita real income grows at less than 1 per cent per annum, as has in fact been the case during the 1960's, and if the distribution of income becomes more skewed, then, with the yardstick of effective demand which would keep the relative price of foodgrains constant, a growth rate even lower than that realised can be shown to be adequate. But if the economy is made to grow faster and a sizeable dent is sought to be made on the problem of India's poverty by enlarging employment opportunities, the realised growth rate starts showing itself to be inadequate. To indicate roughly the magnitudes involved, let us illustrate.

If the national income is planned to grow at a rate such that, given the compound growth rate of population at 2.2 per cent per annum, per capita consumer expenditure increases at 3 per cent per annum and, further, if income inequalities are sought to be reduced so as to bring down the concentration ratio pertaining to the distribution of population between the different expenditure classes from the initial level of 0.33 to 0.25 over a decade, the growth rate of demand for foodgrains would rise to 4 per cent per annum. The above objectives, however, imply an increase in the per capita expenditure of the poorest four deciles of the population at 5.4 per cent per annum. If it is assumed that their incomes (and expenditures) grow roughly in proportion to the number of man days worked, the employment opportunities for these people would need to expand at over 7.5 per cent, and for the population as a whole at under 4.5 per cent per annum.

If this goal is found too ambitious to pursue, and the task of bringing down the concentration ratio by the same magnitude is sought to be achieved over a longer span of, say, 15 years, the growth rate of demand for foodgrains would be around on average of 3.6 per cent per annum for the period. This would still require an expansion of employment opportunities—measured in terms of man days—for the bottom four deciles of the population at over 6.5 per cent, and for the population as a whole at 4 per cent per annum.

If even this goal is found too difficult to achieve so that only the per capita expenditure is planned to grow at an annual rate of 3 per cent but no effort is made to improve the income distribution, the demand for foodgrains would grow over the next decade at an average rate of 3.5 per cent per annum.

It may here be pointed out that the attainment of the first objective would still leave 15 per cent of the population below the poverty line at the end of a decade; the attainment of the second would leave 10 per cent of the population below this line at the close of a 15 year period; and the pursuit of the third would take more than seven five year plan periods to lift the entire population above the poverty line, the line itself being defined as a meagre per capita expenditure of Rs. 20 per month at 1960-61 prices. Since the concentration ratio assumed for 1970-71 is the same as obtained in 1960-61, any deterioration in the income-distribution that may have occurred over the period, as some believe it to have occurred, would leave the end results of the efforts implied in these objectives even poorer than those indicated above.

It is thus clear from these illustrative exercises that unless we set our sights in respect of income-employment goals so low as not to be able to make much dent on the problem of India's poverty except over a very long haul, the growth rate of foodgrain output over the next decade would need to be higher, at any rate not significantly lower, than 3.5 per cent per annum. The magnitude of the effort involved in achieving this step-up, however, does not fully come to the surface unless we juxtapose the required growth rate for foodgrain output with that required for the cash crops.

Having regard to the fact that the expenditure elasticities of demand for cash crops are around unity or above, the growth of 3 per cent per annum in the per capita expenditure would imply a growth rate of around 5.5 per cent per annum in the demand for cash

crops. However, whereas the need is for achieving for cash crops a much higher growth rate of output than for foodgrains, what has been happening since the mid-sixties is exactly the reverse of it. While the growth rate for foodgrain output has been about maintained, that for cash crops has suffered a sharp contraction in recent years; the index for the production of cash crops in 1970-71 compared with that for 1964-65 shows an increase of less than 0.5 per cent annum.

Even at the risk of appearing to sound alarming, I should like to underscore the gravity of the situation in which the growth rate for cash crops has dwindled to less than 1/11th of what would seem to be required by the growth of population and per capita expenditure postulated above. The situation seems to be most serious in respect of the fibres which have registered a considerable decline since 1964-65. This is not entirely without its bearing upon the crisis in the cotton textile industry which we have witnessed of late. Instead of providing more employment, it has, during the 1960's; dispensed with at least 60,000 persons employed in it; as against 7,93,000 persons employed in 1961, their number did not go beyond 7,34,000 in the first seven months of 1971. While one may legitimately debate the appropriate weight to be assigned to this industry in the index of industrial production—whose rate of increase has slumped during the first half of 1971 to less than 2 per cent over the index for the corresponding period last year—, and may even derive solace from the comparatively better performance of the small scale industry which does not occupy a place in the index, the fact remains that man does not live by bread alone. And if we are to pursue our income-employment goals not only the availability of foodgrains, the most important of the wage-goods, has to be enlarged but also a modicum of cloth and other things have to be provided.

It is therefore important to enquire into what lies beyond this near-paralysis in the output of cash crops. Since the growth rate of productivity for cash crops seems to have been about maintained, the decline in the growth rate of output appears to be ascribable almost entirely to the loss of area these crops have suffered during recent years. It is true that the average annual rate of increase of the gross cropped area itself has fallen; since 1964-65, it has been around 0.6 per cent per annum. But this is only a part of the story. The other part, no less significant, is that foodgrains have acquired acreage at a faster rate. In the upshot, cash crops have lost acreage to foodgrains not only in a relative sense but also in the absolute.

True, in a consideration of a short period of six years, in which factors like unfavourable weather could well have played a part, the significance of a trend cannot be attributed to this downward drift of acreage, and yet it is difficult to miss the pull of the new technology in transferring acres from cash crops to foodgrains.

Even though an exhaustive study of area shifts from cash crops to foodgrains with a view to uncovering the factors which lie behind them is a much more ambitious exercise than I have been able to undertake, the selective evidence I may present here is nonetheless instructive. Between the terminal years 1964-65 and 1970-71, the All India cotton acreage has fallen by about 7.5 lakh hectares of which Madhya Pradesh alone accounts for a little more than 2 lakh hectares. In this State, this acreage which initially shifted to jowar, presumably under the stimulus of a price advantage, subsequently seems to have been moving to wheat with the spread of the high-yielding varieties of seeds. Most of the decline in cotton occurred between 1964-65 and 1968-69 during which period jowar added to its area much more than cotton had lost. Between 1968-69 and 1970-71, jowar lost some 4 lakh hectares while wheat gained 2.7 lakh hectares, the area under the high-yielding varieties of wheat having increased to 2.2 lakh hectares by 1970-71. In Punjab, likewise, the decline of a little less than 1 lakh hectares of area under cotton appears to be connected with the progress of the high-yielding varieties specially of rice, bajra and maize. In some districts like Ludhiana cotton seems to have lost ground to maize, in others like Patiala and Amritsar to maize and rice, and in yet others like Ferozepore to either maize, bajra and rice or to all of them. Since the decline in cotton area is much less than the increase in the area under these several foodgrain crops, it is difficult to be certain as to which ones have attracted the cotton acreage. But this much is clear that in the case of all the three cereals the high-yielding varieties of seeds have made a considerable headway.

Groundnut has lost some 3.5 lakh hectares in Gujarat but since it has gained area in other States, the decline in the country as a whole is only a little more than 80 thousand hectares. In this State, this area seems to have shifted principally to bajra which has gained about 3 lakh hectares over the same period. Considering the district-wise picture, one finds that in Amreli a decline of 30 thousand hectares under groundnut is associated with an increase of 40 thousand hectares in bajra; in Broach a decline of 13 thousand hectares in the former has accompanied an increase of 17 thousand hectares under jowar; in Bhavnagar a loss of 72 thousand hectares for ground-

nut has been matched by an increase of 73 thousand hectares under bajra; and in Rajkot a decline of 26 thousand hectares under groundnut has been associated with an increase of 21 thousand hectares under bajra. In Gujarat, the high-yielding varieties of bajra have made an impressive headway, the proportion of the total area under the cereals covered by the high-yielding varieties in 1970-71 being a little over 30 per cent.

Jute too seems to have lost acreage although moderately. A significant part of this decline has taken place in Bihar mostly in the districts of Purnea and Saharsa; in the former, jute has lost some 16 thousand hectares while autumn-rice has gained about 27 thousands hectares and in the latter, jute has lost about 5 thousands hectares whereas autumn-rice has gained 9 thousand hectares. Here too, the high-yielding varieties of rice grown in the autumn season have made a considerable headway.

The above evidence, though not conclusive, is yet suggestive of the fact that the higher profitability associated with the high-yielding varieties of seeds in the case of crops where they have yielded successful results has been a factor behind the suction by foodgrains of cash crop acreage. In saying this, I am not criticising the new technology. After all, it is not the fault of the new seeds that technological breakthrough has not simultaneously occurred across the board. I am quite aware that science cannot be ordered about to produce the desired results precisely when they are needed. Nevertheless, when a technological breakthrough in one segment transmits its ripples into the others, the emerging imbalances have to be corrected.

The only satisfactory solution of the problem lies in matching a technological advance in one segment with like advances in the others. Except for some success in evolving the high-yielding varieties of cotton, among which Hybrid-4 occupies the pride of place, there is little that offers the hope for achieving a sizeable step-up in the growth rate of cash crop output in the near future through a spurt in their per hectare productivity. There are of course measures each of which, though singly, can produce only modest results but which, taken together, can contribute to a significant increase in per hectare yields. While these have to be pressed into service to produce the maximum they can, it would be difficult to expect that a reliance on these measures alone would push up the growth rate of productivity for cash crops from the present 1 per cent per annum to more than 1.5 to 2 per cent annually. It follows that till so long as

a technological breakthrough in the case of cash crops does not occur, the larger part of the step-up in the growth rate of their output will have to be achieved through an expansion in their cropped acreage.

A growth rate of 5.5 per cent per annum for the output of cash crops would then require an addition of some 20 to 25 million hectares to the areas sown to these crops over a decade. It is in this context that the recent phenomenon of area shift from cash crops to foodgrains acquires a disconcerting aspect. Here it needs to be recalled that since the possibilities for the extension of net sown area appear to have very largely exhausted themselves—the Fourth Plan target for the reclamation of land being a meagre 1 million hectares over a 5-year period—, the expansion of gross cropped area has to be achieved for the most part through a rapid increase in cropping intensity. The possibilities for achieving this increase have, of late, brightened as a result of a considerable improvement that has occurred in the efforts to enlarge the irrigation facilities through minor and major irrigation projects. The annual addition made to the net irrigation area between 1967-68 and 1970-71, estimated at an average of nearly 2 million hectares, equals what was being added over 5-year periods between 1950-51 and 1965-66. But at this rate and on the assumption that the entire additional irrigated area yields, on an average, an extra crop a year, an accretion of some 20 million hectares would get made to the present 165 million hectares of gross cropped area over a decade.

Thus, unless performance in this respect is further improved upon, even if the growth rate of productivity for cash crops is stepped up to 2 per cent per annum, the entire addition made to the gross cropped area will need to be assigned to cash crops if their output is to be made to increase at around 5.5 per cent per annum. This is tantamount to saying that the entire burden of accelerating the growth rate of foodgrain output, nay even of maintaining it, will have to be borne by the growth rate of their per hectare productivity. The index for the productivity of foodgrains for 1970-71 compared with that for 1964-65 shows an increase of a little less than 2.5 per cent per annum. The attainment of a growth rate of 3.5 per cent per annum in the output of foodgrains would thus call for a 50 per cent step-up in the recently observed rate of increase in their productivity. This then is a rough indication of the task that awaits us on the foodgrain front.

While assessing our achievements in this segment, therefore, we will do well to remember that if foodgrain output has been able

to maintain its growth rate, this itself it has done by throwing at least a part of its incidence on cash crops through a suction of their acreage. And this is because a real breakthrough in per hectare yields has so far been confined to wheat. While bajra and maize have maintained the growth rates of their per hectare yields, of rice and jowar even this cannot be said.

In fact, the pull of the cereals in drawing area away from other crops has not been confined to cash crops; a good part of the incidence has fallen on the pulses. This has given rise to another imbalance—an imbalance between cereals and pulses within the food-grain basket. Of the 4.5 million hectares which wheat has added to its area between 1964-65 and 1970-71, over one million hectares has come from gram alone. In Punjab, an increase of over 6 lakh hectares under wheat has been associated with a decline of nearly 4 lakh hectares under gram; in Haryana, an increase of about 4 lakh hectares under wheat has taken place alongside of a decline of more than 2.5 lakh hectares under gram; and in Uttar Pradesh, an increase of 19 lakh hectares under wheat has accompanied a decline of 5 lakh hectares under gram. The decline in the area under all pulses is larger.

It may here be mentioned that area was shifting from gram to wheat under the stimulus of irrigation expansion even before the high-yielding varieties of seeds had emerged on the scene; the greater profitability of the high-yielding varieties of wheat has only reinforced the process. The implication of the decline in the output of pulses for the supply of protein from foodgrains becomes obvious if we translate foodgrain output into its protein equivalent: the compound growth rate of foodgrain output measured in terms of proteins is significantly lower at 2.97 per cent per annum for the period 1949-50 to 1970-71 than it is at 3.33 per cent per annum for the period 1949-50 to 1964-65. Pulses being a relatively cheaper source of proteins, a rise in the ratio of their prices to those of cereals consequent upon a decline in their output has cast its obvious incidence on the poorer stratum of the community.

We have at present no high-yielding varieties of pulses; current efforts are focussed on evolving short-duration varieties which it should be possible to raise as catch crops. Advances in this direction, however, need to be vigorous enough to not only off-set but more than off-set the continuing downward drift in the acreage under pulses. Further, these require to be supplemented with a positive

policy of encouraging the production of pulses in regions of low irrigation potential as, for example, Madhya Pradesh.

Another imbalance introduced by the technological lag belongs within the cereals basket, crucially manifesting itself in the disparate performance of rice and wheat. Here it may be mentioned that the high growth rate of wheat output since 1964-65 has so far been sustained in part by the possibilities provided by the displacement of imported wheat and the requirements of building a buffer of the requisite size. Now that the Fourth Plan target for the buffer stock of foodgrains has been realised and the import of wheat has come to a stop, the production of the cereal would have to be sustained principally by the growth rate of domestic demand for wheat. Even if the expenditure elasticity of demand for wheat be rated at around unity, the growth rate of population at 2.2 per cent and of per capita expenditure at 3 per cent per annum can produce a growth rate of demand for this cereal only moderately exceeding 5 per cent per annum. Thus, unless the relative price of wheat is allowed to drift downward, the system may not absorb the production of this cereal much in excess of this rate. Any attempt, then, to support the prices of this cereal at an artificially high level will show itself either in a progressively increasing stockpile of wheat or will seek for it an export outlet. Since, given the ruling international prices for this cereal, domestic wheat cannot be exported without a sizeable subsidy, the feasibility as well as the desirability of this course of action will have to be properly assessed. The building and carrying of a progressively rising stock of wheat is, likewise, a costly operation and it would be neither desirable nor possible to undertake it on a continuing basis. Considering now the further fact that the expenditure elasticities of demand for coarse grains are either negligible or negative so that the demand for these cannot be expected to grow much in excess of the growth rate for population, it becomes clear that for improving upon the growth rate of foodgrain output, in fact even for maintaining it, a breakthrough on the rice front is an immediate necessity.

In this connection, it is encouraging to hear that a new range of high-yielding, slender-grained, disease-resistant dwarf varieties of rice with good cooking and milling qualities is on the way. This certainly is a major development. But now that this technological advance has to be translated into production performance on the farmers' fields, one has to emphasise such other problems as water control and management without a satisfactory tackling of which the

promise of these seeds may not be adequately realised. A massive effort in this direction is now required. The large potential for irrigation existing in the ground water resources especially of the Indo-Gangetic belt has to be exploited at a much faster pace than has been the case so far. This will not only help accelerate the growth rate for the production of rice but also enlarge the much needed employment opportunities, through the building of infrastructure as well as raising the cropping intensity, in the densely populated eastern part of the country. The fact that, with its potential for irrigation, this region is likely to figure prominently in a breakthrough in rice output when that occurs is of great significance. For it will help reduce regional disparities in incomes or at least moderate possible tendencies towards an increase. The context invites attention to the high degree of regional concentration which has characterised the increases in foodgrain output in recent years, over two-thirds of the increase in 1969-70 over the production in 1964-65 having been contributed by three States alone, Haryana, Punjab and Uttar Pradesh. And even though the share of these States in the increase in foodgrain production in 1970-71 over that in 1964-65 dropped to half of the total primarily because of a sudden spurt in production in Rajasthan, if we exclude this last as it was for the most part inspired by favourable weather, the geographical pattern of the more enduring component of the increase would not be far different from that for the preceding year. While every credit is due to these States which have performed so impressively, there is no gainsaying that other States and regions too have to be lifted and most of all such pockets of concentrated poverty as, for example, eastern Uttar Pradesh, Bihar and Orissa.

This then is a part of the vista which the possibilities of improvement on the rice front are tending to unfold. But if I may be pardoned a digression into what is perhaps a premature speculation into the somewhat distant future, I should add that these possibilities carry with them a problem too—a problem that resides in the modest expenditure elasticity of demand for this cereal. The expenditure elasticity of demand for rice is about half of what it is for wheat. This is partly because there is a much wider range of varieties for rice than for wheat so that even though the elasticity for a given variety may be high, for all varieties taken together it tends to be low. In part, it is also due to the fact that in many of the rice producing areas, rice being the only cereal or overwhelmingly the most important of the cereals grown, it has over time made for a certain specificity in the preferences of the population in these regions

in favour of rice. In the wheat tracts, on the other hand, alternative cereals being relatively more important in the cropping pattern, the substitution between these and wheat becomes easier at the level of consumption. Be that as it may; the fact remains that this being the situation, the demand for rice cannot be expected to grow at the rate at which the demand for wheat has increased. Should a vigorous process of expansion, therefore, overtake the production of rice in the coming years, then, given the limited possibilities of the export outlet, the growth rate of its output could hit against the barrier set—at a lower level than that for wheat—by the growth rate for the demand for rice. The possibilities for the diversification of the production basket in the rice tracts would therefore need to be explored well in time for facing this problem in the longer-term context.

In the case of wheat this problem has already arisen. And in respect of the coarse grains, it is likely to assume a severer edge even before it happens in the case of rice, for it bears on the income levels of the already poor cultivators in the dry farming tracts. The low or negative expenditure elasticities of demand for coarse grains merely reflect the fact that with rising real incomes of the people, these will increasingly get pushed into the category of 'inferior goods'. An appropriate technology for the regions of dry farming, then, has not merely to focus on making the farms there economically viable but on reducing the unit costs of production of these cereals—possibly through the route of mechanisation in, say, the semi-arid tracts—so as to enable their increasing utilisation as cattle feed. Side by side, ways would need to be devised to help some of the cash crops, like cotton and groundnut, to hold their own in regions of dry farming where they presently predominate. In respect of rice, in contrast, the problem of diversification is likely to prove more intractable in the deltaic regions where rice is perhaps about the only crop that can be grown, if the solution is sought within the framework of crop husbandry.

In referring to these problems of the medium and the longer-run, it would be pretentious on my part to imply that I have their answers—answers that we may wait upon collective work and wisdom to supply. And I would be sorry indeed if a reference to these problems were to generate any sense of complacency with regard to the tasks that immediately await us on the foodgrain front,

Compound Growth Rates in Agriculture : All-India

(Per cent/per annum)

<i>Crop</i>	<i>1949-50 to 1964-65</i>	<i>1949-50 to 1970-71</i>
Area		
Rice	1.33	1.18
Wheat	2.68	2.48
Cereals	1.29	1.17
Pulses	1.89	0.91
All Foodgrains	1.41	1.13
Foodgrains excluding wheat	1.20	0.98
Oilseeds	2.68	2.02
Cotton	2.46	1.47
Jute	3.01	1.67
Sugarcane	3.27	2.72
Non-foodgrains	2.61	1.89
All Commodities	1.61	1.26
Production		
Rice	3.48	2.92
Wheat	4.00	5.00
Cereals	3.24	3.13
Pulses	1.65	0.94
All Foodgrains	3.05	2.89
Foodgrains excluding wheat	2.90	2.40
Oilseeds	3.33	2.77
Cotton	4.56	3.17
Jute	3.50	1.96
Sugarcane	4.52	3.99
Non-Foodgrains	3.63	3.03
All Commodities	3.25	2.93
Yield		
Rice	2.13	1.72
Wheat	1.27	2.47
Cereals	1.93	1.94
Pulses	-0.24	0.03
All Foodgrains	1.63	1.74
Foodgrains excluding wheat	1.63	1.51
Oilseeds	0.63	0.74
Cotton	2.04	1.67
Jute	0.48	0.28
Sugarcane	1.21	1.24
Non-foodgrains	1.00	1.12
All Commodities	1.61	1.66

Note : For the drought years, 1965-66 and 1966-67, adjusted index numbers have been used.