Agricultural Growth and Stagnation in India

C H Hanumantha Rao

The object of this 'paper is two-fold:

(1) to analyse the trends in agricultural growth in the country as a whole and in different States during the period 1949-50 to 1961-62 with a view to bringing out the main ingredients of past experience; and

(2) to examine some of the current explanatory hypotheses relating to the relative stagnation of the agricultural sector. An attempt is made in this process to suggest the policy implications of the explanations that are found to be more relevant.

THE All-India and State index numbers of agricultural production, area and productivity issued by the Ministry of Food and Agriculture fill a significant gap in available knowledge regarding the trends in growth. These index numbers are constructed after making due adjustments in the original data for changes in coverage and methods of estimation and are, therefore, comparable over time. For the purposes of this study All-India growth rates have been obtained by fitting a linear equation $y = a + bx$ to these series of index numbers.

Two Seven-Year Periods

Separate growth rates have been estimated for two seven-year periods 1949-50 to 1955-56 and 1955-56 to 1961-62. These estimates given in Table 1 reveal that the rate of food-grains output had already slowed down from 4.4 per cent in the first seven-year period to 3.8 per cent in the later years, so that the growth rate of aggregate crop output remained more or less constant (4 per cent) despite an acceleration in the rale of growth of non-food grains from 3 per cent to 4.5 per cent. Another significant fact to note is that the growth of area under crops slowed down considerably from 2.8 per cent to 0.9 per cent between the two periods.

It would be interesting to know the relative contributions of area and productivity to the growth of output in different periods. If productivity per acre remained constant, output would grow at the same rate as the growth of area. Therefore, the growth of output attributable to the changes in productivity is given by the difference between the growth rates of output and area. The percent contributions of area and productivity to the growth of output computed on this basis show that although for the 13 year period under study, area accounted for 48 per cent of growth in output, its contribution declined significantly from as much as 72 per cent to 23 per cent between the two periods. Thus, increases in productivity per acre accounted for as much as 77 per cent of output growth in the later period.

It would appear from this that the increase in area as a source of growth has almost exhausted itself in the Third Plan period and that further growth of output could be achieved mainly through the increases in productivity per acre. Although the growth of productivity accelerated between the two periods studied, it is clear that only a much higher rate of growth in productivity could have accelerated the growth of output in the Third Plan period. The Mid-Term Appraisal of the Third Plan revealed significant shortfalls in the supply of two main productivity increasing factors, viz, irrigation water and fertilizers. There was an element of spontaneity in growth so long as area was an important factor. Increase in productivity, on the other hand, requires input intensification involving large outlays—both public and private as well as considerable organisational and administrative efforts. The difficulties associated with input-intensification in this new phase seem to lie at the root of the present stagnation in agricultural output.

Marked Departures

The inter-State disparities in the growth of agricultural output are quite marked. The growth rate ranges from about 5 per cent per annum in the case of Punjab and Madras to just around one per cent for Assam, Orissa and West Bengal (see Table 2). That productivity per acre has become a predominant factor in growth is evident from the fact that all the seven States where growth of output is above the national average reveal higher growth rates in respect of productivity also. Except for Andhra Pradesh, the growth in productivity among the remaining eight States of slow growth was below the national average. No such correlation is found between the growth rates of output and area: the growth of area was lower than the national average for at least four of the Seven states in the higher range.

Another important feature of agricultural growth in this period is the marked shift in the crop patterns in different states. Table 3 shows that Kerala and Andhra Pradesh whose growth of aggregate crop output was below the national average, were well ahead of the national average in regard to food grains output. Likewise, the growth rate of non-food grains in Gujarat, Uttar Pradesh and Rajasthan was above the national average despite their slow overall progress.

Output and Yield

Again, the growth of output is found to be significantly correlated with the growth of productivity both in the case of food and non-food grains. On the whole, it would seem that high overall progress is associated with balanced growth between food and non-food grains. Punjab, Madras Madhya Pradesh and Mysore represent such a category. On the other hand, the areas of lowest overall progress, viz, Assam, Orissa and West Bengal are those whose performance is below the national average both in respect of food and non-food grains.

How would one explain these disparities in growth between different States? A State is a highly heterogeneous unit and may very often conceal significant differences in growth between its constituent units. Although the study of growth factors would be precise and more fruitful at a much disaggregated level, it should nevertheless be possible to discern factors which have a fair degree of validity over space. The hypotheses discussed in this connection fall broadly into two categories, viz, those which emphasise the institutional factors, move specifically the incentives associated with farm size and tenure conditions and those which emphasize material inputs—traditional as well as modern. It is true that the average size of farm is low in quite a number of States recording slow progress viz, Kerala, Uttar Pradesh, Assam, Orissa

and West Bengal (see col 6 of Table 4), But it will be Seen that the *net* value of agricultural output per acre in these Stales is invariably higher than the All-India average (col 5). In fact, in the case of Kerala and West Bengal it is nearly twice the All-India average. Therefore, in a vast country like India where there are extreme regional variations in the soil-climate-crop complex, farm size is not a sufficient indication of income level. Moreover, Madras and Bihar where the average farm size is lower than the national average recorded satisfactory progress. Besides, Kerala with extremely low size of farm showed an impressive performance in regard to food grains while Uttar Pradesh was above the average in regard to non-food grains. It is hard to reconcile the resilience shown by these States with the 'disabilities' of size.

Size of Farms

The size problem may become relevant in a different sense within each homogeneous region. The Farm Management Studies conducted in various parts of the country have shown that output per acre is generally higher among the smaller farms and that it shows a significant decline with the increase in farm size. That this should be so is understand able in view of the prevailing labour-intensive techniques and when there is abundance of labour among smaller farms. Also, large farmers encounter supervisory and managerial bottlenecks as they have to operate with a large number of paid labourers. The logical implication of these findings is that output and productivity can be maximised if ceilings on land holdings are imposed at a sufficiently low level and surplus lands distributed among small farmers. But if a significant redistribution of land under the existing socio-political conditions in India is ruled out. Then an alternative size policy suited to the immediate requirements of growth would have to be pursued. Even though the application of labour may be higher among smaller farms they may lag behind the larger ones in regard to *the* application of technologically new inputs such as fertilizers, improved seeds and insecticides, etc, owing to their low investiblc surplus. But this problem cannot be solved by merely amalgamating the existing small farms into larger ones .unless an opperessive policy of extracting surpluses is adopted. Since smallness of size *as such* does not offer any technical hindrance to the application of modern inputs, the provision of credit to the smaller farms in a liberal way should meet the ends of growth. The enormous agricultural progress achieved by Japan despite the smallness of farm size should dispel many misconceptions in this regard. Although the large farms may be relatively quick in taking to improved techniques, progress may still be restricted owing to the managerial difficulties. The supply of mechanical power through small tractors and pump sets would promote the intensive use of land by lessening the managerial and supervisory difficulties. Such a technology may even increase the overall employment of labour by making possible the extension of intensive methods of cultivation such as irrigated farming to new areas. The structure of employment may alter but the volume of employment may not necessarily decline. The provision of credit to the small farmers in a liberal way and mechanical power to large farmers could well be the two main elements *in* a growth oriented size policy.

Estimates of cultivated area under pure tenancy are available for different states from 1961 Census. Consi-

Table 1: All India Linear Growth Rates of Crop Production, Area and Productivity

	1949-50 to 1955-56	1955-56 to 1961-62	1949-50 to 1961-62
Production :			
(i) Foodgrains	*4.4*	*3.8*	*3.6*
(ii) Non-foodgrains	*3.0*	*4.5*	*4.2*
All Crops	*3.9*	*4.0*	*3.9*
Area :			
(i) Foodgrains	*2.5*	*0.7*	*1.6*
(ii) Non-foodgrains	*4.3*	*1.7*	*3.1*
All Crops	*2.8*	*0.9*	*1.8*
Productivity :			
(i) Foodgrains	*1.8*	*2.7*	*1.8*
(ii) Non-foodgrains	*—1.0*	*2.0*	*0.8*
All Crops	*1.0*	*2.6*	*1.7*

Source : Ministry of Food and Agriculture, *Agricultural Situation in India*, July 1963.

Table 2: State Linear Growth Rates of Agricultural Production, Area and Productivity During 1952-55 to 1961-62
All Crops

State	Production	Area	Productivity
1	2	3	4
(1) Punjab	*5.6*	*2.6*	*2.6*
(2) Madras	*4.9*	*0.7*	*4.0*
(3) Himachal Pradesh	*3.8*	*0.8*	*2.8*
(4) Madhya Pradesh	*3.6*	*1.4*	*2.1*
(5) Mysore	*3.6*	*1.3*	*2.1*
(6) Maharashtra	*3.5*	*0.5*	*2.9*
(7) Bihar	*3.4*	*1.1*	*2.2*
ALL INDIA	*3.2*	*1.3*	*1.8*
(8) Rajasthan	*2.9*	*3.9*	*—0.8*
(9) Kerala	*2.4*	*1.2*	*1.2*
(10) Gujarat	*2.2*	*0.7*	*1.5*
(11) Uttar Pradesh	*2.1*	*0.9*	*1.1*
(12) Andhra Pradesh	*1.9*	*—0.1*	*2.0*
(13) Assam	*1.3*	*1.6*	*—0.2*
(14) Orissa	*1.2*	*0.5*	*0.7*
(15) West Bengal	*0.9*	*0.2*	*0.5*

Source : Economic and Statistical Adviser, Ministry of Food and Agriculture, G O I, "Growth Rates in Agriculture" (mimeographed).

derable degree of precision attaches to these estimates as the information was elicited directly from the tenants themselves. Figures of area under mixed tenancy are not yet available out they may reasonably be assumed to vary between different States in the same direction as the area under pure tenancy. These figures do not reveal any precise relationship between the tenurial conditions and agricultural development. Although some States of slow overall growth, notably Kerala and West Bengal, account for very high ratios of cultivated area under pure tenancy (see col I of Table 4) there are significant exceptions notwithstanding the fact that it is difficult to reconcile this with the impressive performance of Kerala in regard to food grains. Pure tenancy is above the All India average for States of highest growth, viz, Punjab *and* Madras. Similarly the ratios are quite low for many States revealing slow progress, viz, Onssa, Uttar Pradesh, Rajasthan and Gujarat.

Fertility and Tenancy

The 1961 Census revealed that the proportion of tenanted holdings were particularly concentrated in the fertile coastal belts (see P S Sharma, "A Study of the Structural and Tenurial Aspects of Rural Economy in the light of 1961 Census," mimeographed). A precise study of the relationship between land fertility and tenancy would be possible only at the held level. But even at the State level one finds a strong positive association between the proportion of area under tenancy and the productive capacity of land .see Table 4). Among all the seven States where the proportion of area under pure tenancy is distinctly higher than the national average, the proportion of area irrigated is also well above the national average. In as many as five out of seven States where the area utider tenancy is below the average, the proportion of irrigated area is also below the average. Further, the States where tenancy is significant, viz, Kerala, West Bengal and Assam account for very high annual rainfall. It will also be seen that except for Punjab and Mysore, the remaining six States are characterized by high density of rural population. Also, the net value of agricultural output per acre for these States is distinctly higher than the national average.

These facts provide, in the first place, a rationale for the concentration of tenancy in fertile areas: land should be fertile enough to yield sizable surplus to feed both the tenant and the landlord. Also, since the element of risk and uncertainty is considerably reduced because of the assured rainfall and irrigation, this would result in the high density of agricultural workers owing partly to the large-scale original settlements on fertile soils and also presumably to the higher rate of population growth resulting from the assured supply of food. All this would encourage tenancy because the rents would more or less be equated to the surplus that landlords would alternatively get by cultivating the lands themselves through hired labour.

Exaggerated Fears

The next important implication is that owing to the excessive demand for land, it becomes extremely difficult to obtain proper records of tenancy and to regulate rents through administrative action. Any administrative decree in this respect would most certainly drive tenancy underground with secret arrangements between the landlord and the tenant because of the real possibility of subsistence for both.

Lastly, from the standpoint of growth these facts should serve to dispel certain exaggerated notions regarding the discouragement of inputs among tenanted holdings. Since labour is abundant with hardly any opportunity cost, its application will add to the income of the tenant so long as the marginal product of labour is possitive. The Farm Management Studies have revealed that the input of labour is highest for predominantly tenanted holdings and their output per acre is higher than for larger holdings operated through hired labour, as the input of labour among the latter can be extended only upto the point where the net marginal product is equal to the wage rate. There is no reason to believe that the fear of resumption of land by the landloid would discourage investments by the tenants in the input factors which are mobile such as bullocks and implements. In theory, the investments in permanent improvements on land would be discouraged but this becomes largely irrelevant when the tenanted holdings are situated in fertile coastal or irrigated areas. Again, the investments in modem inputs such as fertilizers, improved seeds etc would, in principle, be discouraged if the tenants have to bear the full costs on them. But if landlords share such costs in the same proportion in which they realise rents from gross produce, then it would be profitable for both the tenants and landlords to invest in such factors until the marginal cost equals marginal revenue.

The practice of sharing inputs between landlords and tenants is not un-

Table 3: State Linear Growth Rates of Agricultural Production and Productivity Dining 1952-53 to 1961-62

Food and Non-Foodgrains

Food Grains			Non-Food Grains		
State	Production	Productivity	State	Production	Productivity
1	2	3	4	5	6
Madras	4.6	4.2	Punjab	9.1	3.7
Punjab	4.5	1.8	Maharashtra	5.6	4.3
Himachal Pradesh	4.2	3.3	Madras	5.6	2.8
Kerala	4.1	3.7	Gujarat	5.4	—1.3
Madhya Pradesh	3.5	2.0	Mysore	5.2	3.6
Bihar	3.4	2.3	Uttar Pradesh	4.7	2.5
Andhra Pradesh	3.3	2.2	Madhya Pradesh	4.5	2.8
Mysore	2.9	1.5	Rajasthan	4.4	0.4
ALL INDIA	2.7	1.5	*ALL INDIA*	4.4	1.7
Rajasthan	2.6	—1.0	Bihar	3.8	0.6
Maharashtra	2.6	2.0	West Bengal	3.5	—0.3
Orissa	1.4	0.8	Assam	2.0	0.4
Uttar Pradesh	1.1	0.4	Kerala	1.8	0.1
Assam	0.6	—0.9	Himachal Pradesh	1.0	—2.0
West Bengal	—0.2	—0.2	Orissa	—0.3	1.2
Gujarat	—1.1	1.9	Andhra Pradesh	—1.0	3.4

Source : Economic and Statistical Adviser, Ministry of Food and Agriculture, G O I, "Growth Rates in Agriculture" (Mimeographed).

common in this country. In tact, the so called "concealed share cropping tenancy" is characterised by the system of sharing inputs. A recent study made by Wolf Ladejinsky in the Package districts where nearly 60 to 80 per cent of cultivated area is irrigated revealed that although about 50 per cent of cultivated area is under tenancy mainly through "off the record" arrangements, the expenditure on fertilizers is generally shared equally between the landlords and the tenants.

Japanese Experience

The Japanese experience in this respect has a particular relevance to Indian conditions. During the whole period of over half a century right from the Meiji Restoration to the close of Second World War, when the technological break-through in agriculture was effected mainly through the extensive use of fertilizers, improved seeds etc, the area under tenancy continued to constitute nearly 50 per cent of cultivated area (See Takekazu Ogura Ed, "Agricultural Development in Modern Japan"). However, there is no gainsaying the fact that if somehow ownership rights can be conferred on the tenants in India such as had happened in Japan after the Second World War, agriculture would become more dynamic. But if past experience in India rules out this possibility for a reasonable period of time, then we need to have a more pragmatic and growth oriented tenure policy, the objective of which should be to promote input-intensification by insisting that the landlords share the expenditure on improved improvements at least to the extent of 50 per cent. Also credit should be extended to the tenants liberally in order to enable them to avail of these inputs.

Among the material inputs, irrigation is known to bear the highest correlation with productivity. Unfortunately, the latest published statistics on irrigation in India do not extend beyond the year 1958-59. But some interesting information on this aspect is contained in the Food Ministry's "Growth Rates in Agriculture". According to this Bulletin, between 1952-53 and 1961-62, the increases that took place in the gross irrigated area in the first seven States of above average growth are much more than those in the States of slow progress. In Punjab and Madras gross irrigated area went up by 23 per cent and 33 per cent respectively; in Maharashtra it increased by 37 per cent; by 17 per cent in Madhya Pradesh; by 58 per cent in Mysore; and by about 15 per cent in Bihar. Among the States of slow growth, Rajasthan and Assam recorded some increase in the sown area without a corresponding increase in irrigated area leading to the negative growth of productivity. In Kerala, although there was some inciease in the gross irrigated area, the per cent of net area irrigated to net area sown showed a marginal decline. Likewise in Gujarat although gross irrigated area increased appreciably, it failed to have significant impact on productivity because irrigated area constituted hardly 6 per cent of sown area. In Uttar Pradesh gross irrigated area showed a decline of 3 per cent. In Orissa and West Bengal too, there is no evidence of an increase in the proportion of area irrigated. Andhra Pradesh is the only state which despite an increase of 48 per cent in the gross irrigated area and the consequent increase in productivity, failed to show significant growth in overall production. This is explained by the fact that in the dry regions of the State where cash crops used to be grown extensively, net sown area declined by 1.5 million acres between 1956-57 and 1961-62 owing to the continuous failure of rains. On the whole it would appear that the growth in productivity and output in different States is found to be significantly associated with the increase in the proportion of area irrigated.

Role of Irrigation

At present, the irrigated area in the country constitutes around 23 per cent of sown area. It has been estimated that about 50 per cent of cultivated area can be brought under irrigation (see Planning Commission, "Memoran-

Table 4: Area Under Pure Tenancy Land Fertility, Population Density and Income Levels

State	Area Under Pure Tenancy as Per Cent of Cultivated Area (1961)	Irrigated Area as Per Cent of Net Sown Area (1958-59)	Average Annual Rainfall (inches)	Rural Population per 100 Acres of Net Sown Area (1961)	Net Value of Agricultural Output	
					Per Acre (1960-61)	Average Farm Size (acres)
	1	2	3	4	5	6
(1) Kerala	*34.7*	*19.2*	100	370	445	1.8
(2) West Bengal	*10.2*	*25.8*	70	270	313	4.1
(3) Punjab	*9.8*	*39.8*	21	110	156	13.8
(4) Assam	*9.4*	*30.0*	92	230	348	4.8
(5) Bihar	*7.4*	*30.0*	48	240	162	4.8
(6) Jammu and Kashmir	*7.1*	*46.1*	40	220	231	—
(7) Madras	*6.6*	*39.0*	34	240	283	4.6
(8) Mysore	*4.8*	*7.6*	42	90	138	10.5
ALL INDIA	*4.2*	*17.8*	—	—	*161*	*7.7*
(9) Maharashtra	*3.8*	*5.6*	47	60	132	12.9
(10) Andhra Pradesh	*3.7*	*25.8*	35	130	157	8.0
(11) Madhya Pradesh	*3.3*	*5.3*	32	80	106	10.6
(12) Orissa	*2.9*	*17.4*	58	130	181	5.2
(13) Rajasthan	*2.6*	*11.5*	21	60	71	16.0
(14) Gujarat	*2.6*	*5.6*	32	60	138	12.5
(15) Uttar Pradesh	*1.7*	*28.8*	40	180	167	5.3

Sources: For Cols 1, 3 & 6: P S Sharma, "A study of the Structural and Tenurial Aspects of Rural Economy in the Light of 1961 Census" (mimeographed); for Col 2: Ministry of Food and Agriculture, G O I, "Economic Survey of Indian Agriculture 1960-61;" for Col 4: S N Sen, "Regional Disparities in Agricultural Development and Productivity in India" (mimeographed); and for Col 5: National Council of Applied Economic Research, "Agricultural Income by States 1960-61".

dum on the Fourth Five Year Plan"). It is evident from the Farm Management Studies that output per acre for irrigated crops is significatly higher than from dry ones ranking from 150 per cent to 400 per cent in different regions. Besides, irrigation increases output by making possible the cultivation of land more than once, in the year. Assuming that, on an average, irrigation would raise output per acre by at least 200 per cent, aggregate output in the country would grow at the rate of 4 per cent per annum if two more acres are irrigated each year out of every hundred. According to a survey of minor irrigation made by the Programme Evaluation Organization of the Planning Commission, over 60 per cent of cultivators in various parts of the country felt that the main problem faced by them in regard to irrigation was the construction of feed channels and the renovation of old tanks and wells. These rural works require community action on a big scale and it is here that the most difficult organizational problems are encountered. The breakdown of traditional leadership provided by the ex-landlords and the failure of Village Panchayats to fill in this vacuum has created a sizable bottleneck in the sphere of community capital construction. Without planned direction and enforcements combined with necessary incentives it is doubtful whether the democratic institutions will, on their own initiative, apply themselves to these tasks. So far as irrigation is concerned it is of utmost importance to reduce the dependence on the usual administrative channels by entrusting this to the technical-cum-representative bodies at the district level constituted exclusively for this purpose with adequate resources as well as powers.

The role of science and technology in promoting agricultural growth in India is being increasingly realised. Theodore W Schultz in his recent book "Transformation of Traditional Agriculture" has advanced a rather persuasive hypothesis to explain the slow growth of agriculture in many of the underdeveloped countries. The basic elements of his hypothesis are: (1) the rate of return on the investment in traditional factors of production has declined to such a low level that there is no longer any incentive for cultivators in poor communities to save a larger proportion of their income to invest in such factors; (2) the only way to stimulate agricultural growth in such communities is to raise the investment opportunities by supplying new agricultural factors — both material and human — that embody improvements in technology and are therefore profitable for farmers to adopt; and (3) these two classes of investment are beyond the means of the individual cultivators and therefore require considerable public expenditures and the organisation of particular public activities to serve the agricultural sector.

Techniques Suited to India

As already mentioned, output can still be expanded profitably through the traditional irrigated farming. Even here, Schultz's hypothesis is relevant as the supply of water on an adequate scale is possible only through the modern means such as irrigation dams, tube-wells and pump sets which are beyond the means of individual cultivators. However, an important difference between these and the other modern factors is that once the water is provided, output can grow through the application of traditional skills at the farm level. It is heartening to note in this connection the crucial role assigned to science and technologv in the future agricultural development of the country (see "Draft for the Fourth Plan"). However, without large scale public investments and community action at the village level for irrigation and soil conservation through afforestation and drainage schemes it is difficult to stimulate growth even through the use of modern factors of production as the profitability of the latter depends crucially on the availability of the former. Considerable public investments in the supply of modern inputs and improving human capabilities are nevertheless required right now for a number of reasons. For one thing, investments in research have a long gestation period and have, therefore, to be undertaken far in advance. Besides, farm children attending schools now will form effective labour force only after two decades or so and will remain in the labour force for several decades thereafter.

Considerable research is needed for evolving techniques suited to the Indian conditions. In a situation where there is considerable uncertainty end risk, and where the ruling interest rates are very high, the profitability of new techniques will have to be quite high for making them acceptable to the cultivators. It may be noted that the Rice Revolution in Japan and the Corn Revolution in the United States were the results of entirely new varieties of seeds suited to their local climate and distinctly fertilizer-consuming. Also, there was a technological break-through in the production of fertilizers leading to an appreciable reduction in their costs. The experiments conducted by the Indian Council of Agricultural Research have shown that under the existing price structure, the application of fertilizers was relatively more profitable for rice than wheat. This explains why the rice growing States of Andhra, Madras, Mysore and Kerala which had about 25 per cent of irrigated area of the country accounted for as much as 50 per cent of fertilizer consumption in the country in 1961 (See Planning Commission, "Third Five Year Plan"). On the other hand, Punjab which had about 9 per cent of the irrigated area of the country consumed only about 3 per cent of country's fertilizers.

These facts suggest the need for strengthening research both for evolving fertilizer-consuming seed varieties suited to different climates and for reducing the costs on fertilizer production. One of the main reasons why Community Development Programme failed to make an appreciable impact on agricultural productivity is that it was extended too soon to too many areas with too little of effective techniques at hand. The solution lies in evolving and promoting profitable technology and not merely in raising the status or salaries of Village Level Workers. All this implies that considerable resources should be allocated to scientific research. It is time the emphasis shifted from the role of agricultural surpluses in economic development to the role of science and industry in the development of agriculture. Agricultural surpluses would automatically emerge through the increase *in* agricultural productivity.