

## Growth Rates in Agriculture

by

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Agriculture occupies a place of pivotal importance in India's economy, providing livelihood to about 70 per cent of country's population and contributing about 50 per cent of the National income. A stagnant agriculture is the main feature of a traditional society. In such a society one finds it difficult to apply the scientific innovations. Modernisation of the economy and accelerated economic growth are possible only if this stagnation is broken for good. Agricultural surpluses are essential for industrial growth. A look out for a system which combines the three factors namely, creation of agricultural surplus wherever possible; but also of industrial surpluses wherever conceivable in order to modernise agriculture and finally, a continuum of democratic economic institutions which make for this interflow between agriculture and industry. India's economic planning is dedicated to the task of devising this mechanism. The success of our efforts for economic development of the country will largely depend upon the order of development achieved in agriculture. The yields are miserably low as compared to the more advanced countries of the world. The result is that even with the bulk of population engaged in agriculture, enough quantities of foodgrains and raw materials are not being produced. Our Five Year Plans accorded a pride of place to programmes of agricultural development. Considerable progress has been achieved in increasing the production and laying the foundations of a progressive agricultural industry. Our experts view that with the gigantic effort in the field of agriculture in the Fourth Plan outlined, we can hope to increase agricultural output at least at the rate of five per cent per annum. The higher targets present a challenge which has, nevertheless, to be faced and there is no other alternative.

A study of the rates of growth in agriculture in the past is important and also useful in several ways. It will enable an assessment of the progress of agricultural development by crops and regions and would provide a telescopic view of the future in the perspective of the past. It will help in locating the weaknesses in the existing policies. Knowledge of the relative performance of the different regions in the past should, however, prove useful in deciding priorities for the future. With this end in view, the present study was undertaken. The main objectives are to study the growth rates of area and production of paddy, sorghum, cotton and sugarcane for all the districts of Madras State and to observe the differences in growth rates, if any, before

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and after the initiation of the Five Year Plans in Coimbatore district in particular.

**Materials and Methods:** Agricultural production includes production of vegetables and livestock products besides cereals, pulses, cotton *etc.* For a proper assessment of trends in area under crops, yield and agricultural production, it is necessary to have a continuous series of estimates on a comparable basis. For want of data, the analysis of agricultural growth has been confined to four crops. Since our interest is more in the absolute growth, the actual area under crops and production have been used. The period covered for the study was from 1950-'51 to 1961-'62. The period was chosen as to see the impact of the Five Year Plans. The data were collected from the Season and Crop Report of the Madras State. For Coimbatore district also the study was made from 1940-'41 to 1950-'51 and from 1950-'51 to 1962-'63 so as to compare the growth rates before and after the initiation of Five Year Plans. It has been observed that linear trends or simpler types of non-linear trends, such as the exponential quite frequently give excellent fits to time series which are not too long and work well for estimation of trend with the limits of the observed series or even for forecasting trend for a few years. Since the aim of the present study is to estimate the trend during specified periods of time for purposes of providing a measure of progress, "exponential" trend has been made use of for estimation of growth rates. The exponential trend gives directly a constant rate of increase/decrease per unit of time and therefore, called the "Compound" rate of growth.

The compound growth rates were fitted by taking time as the independent variable and the area/production of crops as the dependent variable. The function was fitted as  $Y = AB^X$  where, 'Y' = area production of crops, 'X' = time. By taking logarithms of both sides of the equation, it takes the form of  $10\log Y = 10\log a + X \log b$ . This is a linear function and the compound growth rate is given as  $\text{Compound growth rate} = (\text{Anti log } b - 1) 100$ . The compound growth rate represents a uniform rate of change from observation to observation.

**Results and Discussion:** Ever since the launching of the First Five Year Plan, agricultural production has shown sizeable improvement despite year to year fluctuations. To eliminate the effect of cyclical elements, growth rates have been calculated by fitting exponential trends to the data collected. The trend of agricultural growth has been studied with respect to two factors, *viz.*, area under crop and production. The compound growth rates were worked out for each district in Madras State for two food crops, namely, paddy and sorghum and two cash crops, namely, cotton and sugarcane. The growth rates obtained are given in Table 1.

TABLE 1. Compound growth rates during 1950-'51 to 1961-'62.

District	Paddy		Sorghum		Cotton		Sugarcane	
	Area	Production	Area	Production	Area	Production	Area	Production
Chingleput	5.1	12.3	-8.9	7.4	-5.8	1.5	21.2	1.3
North Arcot	5.9	16.1	0.7	3.0	3.2	13.8	8.4	12.2
South Arcot	3.5	12.3	-2.5	-6.9	-8.3	1.5	0.7	1.3
Salem	4.2	14.2	2.3	7.6	10.8	14.9	4.7	5.8
Coimbatore	10.0	20.4	0.4	2.6	2.4	5.2	9.6	10.6
Tiruchirapalli	2.3	8.2	1.5	3.8	0.5	-3.7	2.3	5.2
Thanjavur	1.2	8.2	17.0	17.1	-20.4	-20.9	16.6	16.3
Madurai	2.6	10.6	0.3	3.9	1.5	4.6	3.1	5.1
Ramanathapuram	7.0	14.0	-12.1	3.2	4.3	5.8	12.5	16.1
Tirunelveli	3.0	11.4	0.3	2.4	1.5	2.8	2.8	14.2
Madras State	3.5	11.5	0.7	3.5	2.6	5.1	6.2	7.6

In terms of compound growth rates, which represents a uniform rate of change from observation to observation, area and production of paddy showed a rate of growth of 3.5 and 11.5 per cent per annum respectively for Madras State. The high rate of production than that of area is due to the contribution of productivity (yield) to growth of production than that of area. The growth rate of area under paddy varies from 1.2 in Thanjavur to 10.0 in Coimbatore district. The low growth rate for Thanjavur district may be due to policy of maximising yield of crops per unit. Because of the assured irrigation the aim may be to grow two or more crops so as to secure the highest possible intensity of cultivation than to extend the area under cultivation which is the most scarce factor. Sen (1967) pointed out that "the Intensive Agricultural District Programme and H. Y. V. P. approach with certain improvements and adjustments would appear to be appropriate for this area". The growth rate of production of paddy varies from 8.2 in Thanjavur and Thiruchirapalli to 20.4 in Coimbatore district. The higher growth rates may be due to the introduction of the Intensive Agricultural Area Programmes in districts like Tirunelveli, Coimbatore, Chingleput and Madurai etc. It may also be due to the increase of inputs like fertiliser, improved seeds etc. and extension of irrigation facilities. All the districts of the Madras State achieved high rates of crop output growth more through productivity increase than area expansion.

The growth rates for area under sorghum and production of sorghum have not shown an appreciable increase. The area showed a growth rate of 0.7 per cent per annum while that of production was 3.5. The growth rate was even negative in districts Chingleput, South Arcot and Ramnad. This may be due to the shift in cropping pattern from cholam to other commercial crops like groundnut, chillies etc., which pay more to the cultivators. The

improvement in the standard of living of the peasants might have shifted their consumption from sorghum to coarse varieties of rice. Even in other districts the growth rate is not so high. As regards the growth rate of production except South Arcot district, all show a positive rate. This is due to technological advancement in agriculture. The improvement in yield was responsible for a major portion of the increase in production.

The compound growth rate for area under cotton and production of cotton for Madras State is 2.6 and 5.1 per cent respectively. The productivity of cotton must have played an important part in raising the production, since the growth rate of production is almost twice that of the growth rate of area. In Thanjavur district both the area and production have declined steeply than any other district. In Chingleput and South Arcot districts, though the area under cotton has shown a decrease, the growth rate of production has increased at the rate of 1.5 per cent per annum. As regards the growth rate for area and production, much variation exists from district to district.

Sugarcane is one of the most important commercial crop which is gaining importance in almost all the districts of the State. It has made a growth rate of 6.2 per cent and 7.6 per cent for area and production of gur respectively. This high growth rate both under area as well production may be due to the increasing price for this commodity. Districts like Chingleput, Thanjavur and Ramanathapuram has made a very high growth than other districts in respect of area under this crop. North Arcot, Tirunelveli and Ramanathapuram districts has shown a higher growth rate of production than the area.

In Madras State, the contribution of productivity (yields) to growth of production was somewhat higher than that of the area in the case of foodgrains. The contribution of area in the case of non-foodgrains outweighed that of productivity. Giri (1967) concluded that bulk of the growth of output was contributed by productivity increase in the case of foodgrains and by area increase in non-food crops. Among the competing crops of sorghum and cotton, the latter showed the highest growth rate of area and production, while the former had a very low growth rate of area and a little higher growth rate of production. In the case of cotton the expansion of area was responsible for the high rates of growth of production, but for sorghum, improvement in yield was responsible for a major portion of the increase in production. In the case of the competing crops of paddy and sugarcane, paddy has shown the highest growth rate of production due to higher productivity while it was the growth rate of area for sugarcane. In sugarcane the expansion of area accounts for a major portion of the growth rate of production, whereas the productivity is mainly responsible for the higher production in paddy.

In general, the increase in productivity for foodgrain and increase in area for cash crops is responsible for the higher growth rate of production. The differences in the productivity of the four crops in each district would indicate that certain crops received large share of productivity raising inputs while the others were given scantier attention. On the whole it emerges that crops with high rates of growth of production had high rates of growth of productivity and crops with high rates of growth of area had low rates of growth of productivity presumably due to the extension of cultivation to marginal lands.

The growth rates of area and production of paddy, sorghum, cotton and sugarcane for Coimbatore district has been worked out for the periods 1940-'41 to 1950-'51 and 1951-'52 to 1962-'63 to compare the growth rates before and after the initiation of the Five Year Plans. The compound growth rates obtained are given in Table 2.

TABLE 2. Compound growth rates during 1940-'41 to 1950-'51 and 1951-'52 to 1962-'63.

Crop	Compound growth rate	
	1940-'41 to 1950-'51	1951-'52 to 1962-'63
I. Paddy:		
a) Area	1.3	-0.7
b) Production	12.8	15.3
II. Sorghum:		
a) Area	-2.3	-6.7
b) Production	-0.07	1.4
III. Cotton:		
a) Area	-8.1	-5.3
b) Production	0.08	3.8
IV. Sugarcane:		
a) Area	7.6	6.4
b) Production	10.6	12.8

Though the area under paddy has shown a negative growth rate after the Plan period, the growth rate of production is higher than the growth rate before the plan period. This clearly shows that the productivity of the crop has made an increase because of the steps taken during the plan period. For sorghum also though the area has declined, the growth rate of production is on the increase. The reduction in the area under sorghum may be due to the shift in the cropping pattern from sorghum to groundnut or cotton which gives a higher return per acre than that of sorghum. This is also clearly evident from the reduction in the negative growth rate of area under cotton during the plan period. But the growth rate of production of cotton is very high during the plan period than its counterpart. Though the

increase in area under cotton was attributed as the main cause for the increase in growth rate of production for Madras State as a whole, it is the increase in productivity which contributes a major portion in the increase in production of cotton in Coimbatore district. As regards sugarcane both the growth rates of area and production are higher than that of other crops and the increase in area plays a major role in increasing the production than the productivity of the crop. The sharp increase in the production of crops may be due to the sharp increase in the use of inputs like fertilisers and adoption of improved technology by the farmers of this district

**Conclusion :** The growth rates of area and production of the important crops namely, paddy, sorghum, cotton and sugarcane were worked out for all the districts of the Madras State for the period 1950—'51 to 1961—'62. For Coimbatore district it was worked out for two periods that is before and after the initiation of the Five Year Plan. The increase in the growth rate of production may be due to increase in area and productivity. For crops like paddy and sorghum the increase in growth rate of production is due to the increase in productivity while for cotton and sugarcane it is due to increase in area. As acreage extends, relatively marginal land tends to be put under crops and such lands are prone to be more adversely affected by weather hazards like drought. Again when more intensive doses of inputs like fertilizers are used, the risk of loss from factors like drought tends to increase considerably. The growth rate of productivity has increased considerably in Coimbatore district after the initiation of the Five Year Plans except for sugarcane. This is clearly shown by high growth rate of production of low growth rate of area. As the scope for further extension of area under crops is limited, efforts have to be made to effect further increase in agricultural productivity to provide for the growing needs of the rapidly increasing population.

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