



TRENDS IN THE GROWTH OF AGRICULTURE IN INDIA – A STUDY OF SOME CEREALS: 1951 TO 2013

Ch. PADALU

Research Scholar, Dept. of Economics, Andhra University, Visakhapatnam

ABSTRACT

Agriculture is the largest sector of economic activity in India. The significance of agriculture in India arises also from the fact that the development in agriculture is an essential condition for the development of the national economy. It provides not only food and raw materials but also employment to a very large proportion of population. Agriculture, which is considered as the backbone of India, is now slowly declining in various aspects. The share of agriculture in the GDP at factor cost has steadily declined from 59.2 per cent in 1950-51 to 34.9 per cent in 1990-91; further declined to 22.1 per cent in 2002-03 and further declined to 18.2 per cent in 2013-14. Even the level of employment in this sector is changed. In 1951, 69.5 per cent of the working population was engaged in agriculture. In 1999 it got reduced to 60 per cent. Further, there is more of disguised unemployment in Indian agricultural sector.

The cropping pattern has also changed drastically. It is determined mainly by natural factors like rainfall, climate, soil, technical progress etc. Of the two types of crops – food crops and cash crops, cereals are part of food crops. Food crops also include millets, pulses, vegetables, fruits etc. They cover nearly 2/3rd of the cropped area. The cereals occupy major portion in food grain basket. Nearly 97.3 million hectares of land was under food grains cultivation in 1950-51. It increased to 113.3 million hectares by 2002-03. It further increased to 161.7 million hectare in 2012-13. It further raised to 167.7 million hectars in 2013-14.

We conclude that there has been an improvement in the production of cereals in India but the overall growth rate of agricultural sector is declining. One thing can be made clear that agricultural sector has been totally neglected in the past decade. In the name of reforms and liberalization agricultural farmers have also been adversely affected. The agriculture's contribution to the GDP has reduced in the past years. As India lives in the rural areas it is very much necessary to develop the agricultural sector so that the whole Country develops.

Introduction

Agriculture is the largest sector of economic activity in India. The significance of agriculture in India arises also from the fact that the development in agriculture is an essential condition for the development of the national economy. It provides not only food and raw materials but also employment to a very large proportion of population. Agriculture, which is considered as the backbone of India, is now slowly declining in various aspects. The share of agriculture in the GDP at factor cost has steadily declined from 59.2 per cent in 1950-51 to 34.9 per cent in 1990-91; further declined to 22.1 per cent in 2002-03 and further declined to 18.2 per cent in 2013-14. Even the level of employment in this sector is changed. In 1951, 69.5 per cent of the working population was engaged in agriculture. In 1999 it got reduced to 60 per cent. Further, there is more of disguised unemployment in Indian agricultural sector.



The cropping pattern has also changed drastically. It is determined mainly by natural factors like rainfall, climate, soil, technical progress etc. Of the two types of crops – food crops and cash crops, cereals are part of food crops. Food crops also include millets, pulses, vegetables, fruits etc. They cover nearly 2/3rd of the cropped area. The cereals occupy major portion in food grain basket. Nearly 97.3 million hectares of land was under food grains cultivation in 1950-51. It increased to 113.3 million hectares by 2002-03. It further increased to 161.7 million hectare in 2012-13. it further raised to 167.7 million hectors in 2013-14.

Historical Perspectives of Indian Agriculture

Indian agriculture had reached the height of development much before the now advanced countries of the World. In those days there was a good balance between agriculture and industrial sector. But, the scenario has changed after the arrival of the British. Their policies have completely disturbed the rural economy. It has also affected the balance of development in various sectors of the society. Our farmers were in heavy debt to the private moneylenders. They were having small and scattered holdings. They had neither the money nor the knowledge to buy and use proper equipment, good seeds and chemical fertilizers. Except in certain areas, they were dependent upon rainfall and upon the vagaries of the monsoons. In the British era farmers suffered a lot. As a result the farmers had neither the resources nor the incentives to invest in agriculture. Indian agriculture in the pre-Independence period can be described as a subsistence occupation. It was only after the advent of green revolution in 1966 that some farmers started adopting agriculture on commercial basis. But, now in the past decade agricultural sector is again neglected with the name of Liberalization and Economic Reforms.

Agriculture and Economic Development

There are different views regarding the role of agriculture in economic development. According to some economists, if economic development begins with agriculture it cannot lead to a self sustained growth due to the following reasons: (1) There will not be sufficient capital formation. (2) It will not create the necessary climate for industrialization, and (3) It cannot generate forces of expansion.

According to Nurkse, economic development means in transferring population from agriculture to industries. But, some economists like Arthur Lewis do not completely agree with this view. According to Lewis, in France, prior to 1944, industrialization was slow because agriculture was stagnant. Agricultural development is necessary for the following reasons:

1. Developing agriculture must first create the necessary conditions for industrialization.
2. Food grains for the growing population have to come from agriculture.
3. Raw materials for the industries have to come from agriculture.
4. Developing agriculture can create marketable surplus, which is necessary for economic development.



5. The capital- output ratio in agriculture is low and hence a small capital investment will bring large output.
6. The ratio of savings and investment can be increased if the rate of savings and investment are high in agriculture.
7. Foreign exchange is not very much necessary for agricultural development.
8. Agriculture contributes around 25 per cent to India's national income. Unless there is development in agriculture, per capita income cannot be increased, and
9. Imports are not very much necessary for agricultural development.

Therefore, agricultural development should be given the first priority in India. The neglect of agriculture in the second plan created several problems.

No economic reform will be successful without a steady growth in agriculture. It is estimated that if we want to achieve 5 per cent growth rate in the economy, the growth rate of agriculture should be at least 4 per cent. To achieve this growth rate in agriculture investment in the agricultural sector should be about 25 to 35 per cent of the GDP. Thus, agricultural development is an essential precondition for economic development, especially in a predominantly agricultural country like India. If agriculture is not developed industrialization will be slow.

Contribution to Growth of GDP by Agricultural Sector

In several developing countries agriculture is the main occupation. In India for example 61 per cent of the population is dependent on agriculture. Around 25 per cent of national income is contributed by agriculture. Two thirds of the population lives in villages. Although agriculture is the main occupation it suffers from many defects.

Table-1: Agricultural Sector's Average Shares, Growth Rates and Contribution to GDP Growth

| Period | Share in GDP | Growth rate | Contribution to GDP |
|--------------------|--------------|-------------|---------------------|
| 1980-81 to 1989-90 | 36.4 | 4.4 | 27.5 % |
| 1990-91 to 2000-01 | 28.6 | 2.9 | 14.8 % |
| 1999-00 | 25.2 | 1.3 | 5.7 % |
| 2000-01 | 24.2 | -0.2 | -1.4 % |
| 2001-02 | 24.3 | 5.7 | 25.4 % |
| 2005-06 | 18.8 | 9.5 | 18.8% |
| 2006-07 | 18.3 | 9.6 | 18.3% |
| 2007-08 | 18.3 | 9.3 | 18.3% |
| 2008-09 | 17.8 | 6.7 | 17.8% |
| 2009-10 | 17.7 | 8.6 | 17.7% |
| 2010-11 | 18.2 | 8.9 | 18.2% |
| 2011-12 | 17.9 | 6.7 | 17.9% |
| 2012-13 | 17.5 | 4.5 | 17.5% |
| 2013-14* | 18.2 | 4.7 | 18.2% |

Source: National Accounts Statistics, CSO.

Note: * indicates estimated values.



Table-1 examines the average shares, growth rates and contribution to GDP growth by agricultural sector for various periods. It is clear from the Table that the share of agriculture sector has declined to a great extent from 1980 to 2014. The contribution to GDP has also shown vast fluctuations in the past 25 years. In 2000-01 there were negative contributions from the agricultural sector to the GDP. Contribution of GDP further period fluctuated.

International Comparison of Productivity of Land in the case of Rice and Wheat

Rice and wheat are the most popular and demanded cereals in India. Rice is a tropical and sub-tropical crop mostly cultivated in the monsoon lands of Asia. It is the most important and dominant crop of intensive subsistence agriculture in India. It is the staple food of not only Indians but also many of the south-east Asians. Intensity of rice crop is so high in some areas in India that it is often cultivated twice or thrice a year.

Wheat is the important cereal, which accounts for a major production in the World. It is the principal diet of many countries in Europe, America and Africa. Even in some of the states of India, wheat acts as an important food item.

It will be useful to make a comparison of yield per hectare of these crops - rice and wheat in India with that in some other countries of the World so as to show how much India lags behind the other countries.

Table-2 shows as per 2012 data, in the case of rice, the highest yield in the World is the U.S.A. recorded 83.49 quintals per hectare and it is 35.91 quintals per hectare in India. In the case of wheat the highest yield in the World is the France recorded 75.99 quintals per hectare and it is only 31.73 quintals per hectare in India.

In fact, when we compare carefully the yield per hectare of rice and wheat, we find that the production per hectare generally ranged from 30 to 50 per cent only of the highest average yield in the World. This shows the enormous scope as well as challenges for India to increase the yield levels. This fact demonstrates clearly that the increase in yield per hectare recorded by India under the Green Revolution and the introduction of modern technologies is not particularly unique to India; in fact, it is much less in India than the increase recorded by our neighbouring developing countries like China.

Table-2: Productivity of Land in some Countries in case of Rice and Wheat in 2012

(100 Kgs per hectare)

| Crop | Productivity |
|-------------|--------------|
| Rice | |
| U.S.A | 83.49 |
| Japan | 53.91 |
| China | 67.44 |
| India | 35.91 |



| | |
|--------------|-------|
| Wheat | |
| U.K. | 66.57 |
| France | 75.99 |
| China | 49.95 |
| India | 31.73 |

Source: Agriculture census 2013.

Growth of Agricultural Production in the Plan Periods in India

Food grain production occupies the most dominant position in Indian agriculture, which covers over 65 per cent of the Gross Cropped Area (GCA). Since the beginning of the Green Revolution in the 1966, the Country has shown quite impressive growth in food grain production. Chronic food deficits and hovering Malthusian crisis were overcome and have given way to self-sufficiency in food grains and occasional marginal surpluses by the 1980s and 1990s. However, with the population growing at nearly 2 per cent per year (nearly 18 to 20 million people being added every year) and accelerating income growth, demand for food is continuously growing in the economy. India's food grain production has also been increasing rapidly over the years.

Table-3 explains the trends of agricultural production in the five years plans and it also gives data of the recent years. From the data it is clear that in the plans the production of rice has increased nearly four times, wheat has increased more than ten times, Jowar has a fluctuating progress, bajra also has similar trend like jowar and maize has shown nearly seven times growth compared to the First and the Eleventh Five Year Plan Periods.

Table -3: Trends in Agricultural Production during Five Year Plans

(million tons)

| | First | Second | Third | Fourth | Fifth | Sixth | Seventh | Eighth | Ninth | Tenth | Eleven |
|--------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Crops | 1951-1956 | 1956-1961 | 1961-1966 | 1969-1974 | 1974-1979 | 1980-1985 | 1985-1990 | 1992-1997 | 1997-2002 | 2002-2007 | 2007-2012 |
| Rice | 25 | 30.3 | 35.1 | 41.8 | 47.8 | 54.5 | 65.1 | 78.7 | 87.3 | 85.6 | 97.3 |
| Wheat | 7.9 | 9.7 | 11.1 | 25.4 | 29.8 | 41.2 | 48.3 | 62.9 | 71.3 | 70.2 | 84.4 |
| Jowar | 7.5 | 8.7 | 8.8 | 8.3 | 10.8 | 11.3 | 10.9 | 10.7 | 7.9 | 7.2 | 7 |
| Bajra | 3.4 | 3.4 | 3.9 | 6 | 5 | 6 | 5.2 | 6.7 | 7.1 | 8.2 | 9.2 |
| Maize | 2.7 | 3.6 | 4.6 | 6.1 | 6.3 | 7.3 | 7.6 | 9.8 | 11.6 | 14 | 19.8 |
| Other cereals | 6.6 | 6.5 | 6.3 | 6.4 | 7.1 | 6 | 5.4 | 4.9 | 4.5 | 3.6 | 4 |
| Total food grains | 63.2 | 74 | 81 | 103 | 118.1 | 138.1 | 155 | 189 | 202.9 | 277 | 325.8 |



Growth in the Production of Commercial Crops

Green Revolution was mainly directed towards growth in the production of food grains. It did not affect initially the production of commercial crops or cash crops such as sugarcane, cotton, jute, oilseeds and tobacco. These crops did not record any significant improvement between 1960-61 and 1973-74. The production of sugarcane was reported at 110 million tons in 1960-61 and increased to 126.37 million tons in 1970-71 and then increased to 295.96 million tons in 2000-01 and further increased to 350.02 million tons in 2013-14. However, significant improvement in the output of sugarcane took place after 1973-74.

In the case of production of cotton it was 5.60 million bales in 1960-61, 4.85 million bales in 1965-66, 12.86 million bales in 1995-96, 9.52 million bales in 2000-01, and further increased to 36.59 million bales in 2013-14.

Production of jute was 5.26 million bales in 1960-61. It has gone up to 12.65 million bales in 1985-86, but it decreased to 10.56 million bales in 2000-01 and further increased to 11.58 million bales in 2013-14.

There was a considerable improvement in the production of oilseeds but the improvement was not much so as to be called a 'revolution'. The production of oilseeds was 6.98 million tons in 1960-61 and increased to 10.83 million tons in 1985-86 and further increased and stood at 18.44 million tons in 2000-01, and further raised to 32.88 million tons in 2013-14.

Table - 4: Production of Commercial Crops in India: 1960-61 to 2013-14

(Million tons)

| Year | Crops | | | | |
|----------|-----------|------------|----------|--------------|---------|
| | Sugarcane | Cotton (1) | Jute (2) | Oilseeds (3) | Tobacco |
| 1950-51 | 57.05 | 3.04 | 3.31 | 5.16 | 0.26 |
| 1960-61 | 110.00 | 5.60 | 5.26 | 6.98 | 0.31 |
| 1965-66 | 123.99 | 4.85 | 5.78 | 6.40 | 0.29 |
| 1970-71 | 126.37 | 4.76 | 6.19 | 9.63 | 0.36 |
| 1975-76 | 140.60 | 5.95 | 5.91 | 10.61 | 0.35 |
| 1980-81 | 154.25 | 7.01 | 8.16 | 9.37 | 0.48 |
| 1985-86 | 170.65 | 8.73 | 12.65 | 10.83 | 0.44 |
| 1990-91 | 241.05 | 9.84 | 9.23 | 18.61 | 0.56 |
| 1995-96 | 281.10 | 12.86 | 8.81 | 22.11 | 0.54 |
| 2000-01 | 295.96 | 9.52 | 10.56 | 18.44 | 0.49 |
| 2005-06 | 281.17 | 18.50 | 10.84 | 27.98 | 0.50 |
| 2010-11 | 342.38 | 33.00 | 10.62 | 32.48 | 0.88 |
| 2011-12 | 361.04 | 35.20 | 11.40 | 29.80 | 0.75 |
| 2012-13 | 341.20 | 34.22 | 10.93 | 30.94 | 0.66 |
| 2013-14* | 350.02 | 36.59 | 11.58 | 32.88 | NA |

Note: (1): Production in million bales of 170 kg. each. (2): Production in million bales of 180 kg. each. (3): For nine oilseeds out of eleven in all.

Source: Indian Economic Surveys for various years.

Note: * indicates estimated values.



Tobacco is one of the major commercial crops in our Country. The production of tobacco has not increased substantially during the period under study. The production of tobacco was 0.31 million tons in 1960-61; 0.48 million tons in 1980-81; 0.49 million tons in 2000-01; and further raised to 0.66 million tons in 2012-13. (Please see Table-4).

Growth of Inputs used in Indian Agriculture:

Fertilizer, HYV, irrigation and rainfall are treated as the major components for determining the production/productivity in Indian agriculture. The trends of the above inputs have increased over the years except rainfall, which exercises large-scale regional-variation with respect to time span.

It is to be noted here that during the period 1950-51, the amount of irrigation [measured as Net Irrigated Area (NIA) as a percentage of Net Sown Area (NSA)] and fertilizer [(measured as per hectare consumption of chemical fertilizer (NPK)] were just 17.56 per cent and 0.48 kg. However, both increased to 19.44 per cent and 9.40 kg in 1967-68; and 32.81 per cent and 63.5 kg in 1989-90. During the early phase of economic reforms (1990-91), the figures were 33.58 per cent and 67.5 kg and then increased to 39.21 per cent and 88.85 kg in 1999-2000; and further it increased to 157.5 kg in 2012-13. The percentage growth rate of the irrigation in 2012-2013 over 1950-51 was 111.85. The annual compound growth rate of the irrigation was 0.48 per cent. The percentage growth rate of the fertilizer consumption in 2012-2013 over 1950-51 was tremendously increased to 32,712.5. The annual compound growth rate of the fertilizer consumption was 0.003 per cent.

Corresponding to the figures of irrigation and fertilizer, the coverage of HYV (measured as a percentage of area under food crops) and rainfall (measured as actual rainfall as a percentage of normal rainfall) were 41 per cent and 113 per cent in 1983-84. They increased to 48.3 per cent and 101 per cent in 1989-90. However, during the early phase of economic reforms, these figures were 50.9 per cent and 106 per cent, which increased to 63.5 per cent (HYV) and decreased to 96 per cent (rainfall) in 1999-2000. The coverage of HYV in 2012-2013 over 1983-84 was 95.36. further percentage of rainfall fluctuated. it increased up to 2009-10 further rainfall decreased to slightly. it was 92 per cent in 2012-13. The annual compound growth rate of the coverage of HYV was 3.17 per cent (Please see Table – 5).

Table - 5: Growth of Major Inputs used in Food grain Production in India: 1950-51 to 2012-13

| Year | Irrigation (a) | Fertilizer (b) | HYV (c) | Rainfall (d) |
|---------|----------------|----------------|---------|--------------|
| 1950-51 | 17.56 | 0.48 | NA | - |
| 1960-61 | 18.51 | 1.91 | NA | - |
| 1967-68 | 19.44 | 9.40 | NA | - |
| 1983-84 | 29.37 | 42.9 | 41.0 | 113 |
| 1989-90 | 32.81 | 63.5 | 48.3 | 101 |
| 1990-91 | 33.58 | 67.5 | 50.9 | 106 |



| | | | | |
|---|--------|----------|-------|--------|
| 1991-92 | 35.21 | 69.8 | 53.1 | 91 |
| 1999-2000 | 39.21 | 88.85 | 63.5 | 96 |
| 2005-06 | 33.8 | 136.4 | 65.7 | 99 |
| 2009-10 | 45.17 | 179.0 | 67.3 | 100 |
| 2010-11 | 35.4 | 180.7 | 70.6 | 102 |
| 2011-12 | 36.3 | 164.8 | 79.4 | 101 |
| 2012-13 | 37.2 | 157.5 | 80.1 | 92 |
| % Growth rate in 2012-2013 over six decades | 111.85 | 32,712.5 | 95.36 | -11.88 |
| Annual compound growth rate | 0.48 | 0.003 | 3.17 | -0.62 |

Note: (a). Irrigation: NIA as a % of NSA; (b). Fertilizer: Per hectare consumption of chemical fertilizer Kg/ha; (c). HYV: HYV area as % of area under food crops, and (d). Rainfall: Actual rainfall as percentage of normal rainfall.

Source: Indian Economic Survey.

Growth of Agricultural Inputs and Production in pre and post reforms period

During the early 1980s, the relative figures of irrigation, fertilizer, HYV adoption and agricultural productivity were 27.66 per cent, 32.0 Kg, 34.00 per cent and 1360 Kg/hectare. They increased to 33.58 per cent, 67.5 Kg, 50.90 per cent and 1380 Kg/hectare respectively by 1990-91 and further to 39.83 per cent, 92.98 Kg, 65.30 per cent and 1734 Kg/hectare by 2001-02. and further to 36.3 per cent, 164.8 Kg, 2101 Kg/hectare in 203-14. However, considering the trends of these inputs and outputs under the present scenario, the growth rates of all these items during the pre-reforms period was higher than that of the post-reforms period. This could be seen from Table - 6. During the pre-reforms period (1980-81 to 1990-91), the growth rates of productivity, irrigation coverage, fertilizer consumption, HYV adoption and average rainfall were 2.01 per cent, 0.813 per cent, 3.17 per cent, 1.61 per cent and 0.15 per cent. However, the figures have been changed substantially to 2.272 per cent, 0.256 per cent, 5.711 per cent, 2.311 per cent and 0.050 per cent during the post-reforms period (1991-2013). These results reflected that the trends of agricultural inputs and agricultural productivity were not favorable during the post-reforms period. This might be due to the impact of the reforms process itself. But by examining the trends of rainfall, it was, in fact, clear that rainfall was erratic during the post-reforms period substantially and it has affected the inputs use and thereby agricultural productivity.

Table-6: Growth Rates of Agricultural Inputs and Agricultural Productivity: 1980-2013

| Items | Pre-Reforms Period (%) 1980-91 | Post- Reforms Period (%) 1991-2013 |
|--------------|-----------------------------------|---------------------------------------|
| Productivity | 2.010 | 2.272 |
| Irrigation | 0.813 | 0.256 |
| Fertilizer | 3.170 | 5.711 |
| HYV | 1.610 | 2.311 |
| Rainfall | 0.150 | 0.050 |



Conclusions and Suggestions

Agriculture is a major sector in India and continues to be the lifeline for the Indian economy. Rapid growth of agriculture is, therefore essential to achieve the multi-pronged objectives of the Indian planning system. The Government of India has taken several measures to increase agricultural production and productivity. These measures are responsible for the agricultural revolution, which is called “Green Revolution”. The Green Revolution used hybrid seeds, which substantially raised agricultural yields. In addition the government has taken several steps to increase agricultural production.

In India around 61 per cent of the population is dependent on agriculture but only around 25 per cent of the National income is contributed by the agricultural sector. In case of rice, the U.S.A. reported the highest yield in the World 83.49 quintals per hectare and it is only 35.91 quintals per hectare in India. In case of wheat the France. Recorded the highest yield in the World 75.99 quintals per hectare and it is only 31.73 quintals per hectare in India. It shows the enormous scope as well as challenges for India to increase the yield levels. But in the plan periods in India the production of rice has increased three times, wheat has increased nearly ten times more growth compared to the First and the Eleventh Five Year Plans.

The above analysis clearly envisages that the adoption of chemical fertilizers is the main factor, which determines the productivity of agriculture in the Indian economy. However, it has to be supported by other important agricultural inputs like irrigation, adoption of HYVP, rainfall etc. In the face of positive impact of fertilizer on agricultural productivity, we are indeed faced with a more challenging task. This is because with a view to increase food grain production and other planning objectives, we might lean upon the use of more fertilizers and more pesticides, which would have an adverse effect on the ecology, environment and health conditions of both human beings and animal species on the earth. Further, it is true that an increase in the critical input ‘fertilizer’ above the optimal level may amount to a significant rise in production / productivity. However, under the given circumstances, an economy cannot afford to increase such inputs, as they would be detrimental to sustainable agriculture. Moreover, the present use of resources should not deplete the resource-base to such an extent that the development process becomes dependent and is not sustainable in the future.

We conclude that there has been an improvement in the production of cereals in India but the over all growth rate of agricultural sector is declining. One thing can be made clear that agricultural sector has been totally neglected in the past decade. In the name of reforms and liberalization agricultural farmers have also been adversely affected. The agriculture’s contribution to the GDP has reduced in the past years. As India lives in the rural areas it is very much necessary to develop the agricultural sector so that the whole Country develops.



References

1. Bhalla, G.S. and Singh Gurmail. (2001): Indian Agriculture-Four decades of Development, Sage Publications, New Delhi.
2. Government of India. (2001):“National Agricultural Policy”, Yojana, Vol. 45, No.1, 4-11.
3. Handbook of Statistics on Indian Economy. (2001): Reserve Bank of India, Ministry of Agriculture, Government of India, New Delhi.
4. Iqbal, C. (1979): “High Yielding Varieties of Seeds and their Impact on Agricultural Development”, in A. Mohammad (ed.) book Dynamics of Agricultural Development in India, Concept Publications, New Delhi, India, 71-80.
5. Misra, S.K. and Puri, V.K. (2004): Indian Economy, Himalaya Publishing House, New Delhi.
6. Mohammad, A. (1979): Dynamics of Agricultural Development in India, Concept Publications, New Delhi, India.
7. Rao. C.H.H. (2001): “Technological Change in Indian Agriculture: Emerging Trends and Perspectives”, in K.S. Dhindsa and A.Sharma, (ed.), Dynamics of Agricultural Development, Concept Publications, New Delhi. Vol. 2, 31-49.
8. Singh, K.K., Khan, M. and Shekhawat, M.S. (2000), “Green Revolution - How Green it is?” , Yojana, Vol. 44, No. 6, 26-28.
9. Tilak, J.B.G. (1993): “Education and Agricultural Productivity in Asia: A Review”, Indian Journal of Agricultural Economics, Vol.48, No. 2, 187-200.