

## Agricultural productivity in India: trends during five year plans

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### Key Words

Agriculture, Productivity, food production, major crops, yield per hectare

### Abstract

India has made impressive strides on the agricultural front during the past three decades. Much of the credit for this success should go to the several million small farming families that form the backbone of Indian agriculture and Indian economy. Policy support, production strategies, public investment in infrastructure, research and extension for crop, livestock and fisheries have significantly helped in increasing the agricultural productivity, food production and its availability. The present paper examines the performance of Trends of Agriculture growth and production in India. Andalso The paper has shown the growth and production has significantly increased from during the last three decades and also highlight the performance of the Indian agriculture growth is also increased over the period of time thepresent paper mainly focused on the secondary sources with help of the statistical tools such as mean, standard deviation, covariance, CGR, regression methods has been used for study purpose. From the above evidence we can conclude that overall performance of the Indian agriculture growth and production has shown the significant change in the last three decades. It reveals that the agriculture major crop has increase over the period of time.

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### Introduction

India has made impressive strides on the agricultural front during the past three decades. Much of the credit for this success should go to the several million small farming families that form the backbone of Indian agriculture and Indian economy. Policy support, production strategies, public investment in infrastructure, research and extension for crop, livestock and fisheries have significantly helped in increasing the agricultural productivity, food production and its availability. Notwithstanding these achievements, producing additional food with limited land, and providing economic access to food at the household level for ensuring food security would continue to be a major challenge for the nation. India has experienced considerable changes in the crop mix, yield and production since the inception of the Green Revolution. The Green Revolution phase displayed a high yield growth per unit of input. The first post-Green Revolution phase (from late-1960s to mid-1980s) was marked by the continued growth in returns from land through the intensification in use of chemical inputs and machine labor. The second post Green Revolution phase (beginning the mid-1980s) was characterized by high input-use and decelerating productivity growth. It calls for an examination of the issues related to the trends in agricultural productivity, particularly with reference to individual crops in recent years.

### Objectives and Methodology

The Present Study is based on secondary sources. Secondary data is collected from various Government of India Reports, RBI reports, Ministry of Agriculture reports, books, articles, and Economic Survey of India. In this background, the present study is to analyze the trends and pattern of agriculture growth and Production in India in specific the objectives are:

### Objectives

1. To understand the concept of agricultural productivity in India.
2. To study the significance of agricultural productivity.
2. To study of the direction of agricultural productivity trends in five year plan.

### Indian Agriculture: Performance and Challenges

India is the second largest producer of food in the world: more than 200 million tons of food grains, 150 million tones of fruits and vegetables, 91 million tonnes of milk, 1.6 million tonnes of poultry meat, 417 million livestock, and 6.05 million tonnes of fish and fish products. The Indian agriculture has made great strides over the years. The food grain production has increased more than fourfold - from 51 million tonnes in 1950-51 to 212 million tonnes during 2003-04 growing at an annual average rate of more than 2.4 percent per annum.

India accounts for only about 2.4 % of the world's geographical area and 4 % of its water resources, but has to support about 17 % of the world's human population and 15 % of the livestock. Agriculture is an important sector of the Indian economy, accounting for 14% of the nation's GDP, about 11% of its exports, about half of the population still relies on agriculture as its principal source of income and it is a source of raw material for a large number of industries. Accelerating the growth of agriculture production is therefore necessary not only to achieve an overall GDP target of 8 per cent during the 12th Plan and meet the rising demand for food, but also to increase incomes of those dependent on agriculture to ensure inclusiveness.

### Crop Production

Table 1.1  
Trends in Agricultural Production during Five Year Plans  
(Average Production in Million Units)

Crop	First	Second	Third	Fourth	Fifth	Sixth	Seventh	Eight	Ninth	Tenth	Eleven
Rice	25.0	30.3	35.1	41.8	47.3	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	10.90	10.7	7.9	7.2	7.0
Bajra	3.4	3.4	3.9	6.0	5.0	6.0	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	14.0	19.8
Other	6.6	6.5	6.3	6.4	7.1	6.0	5.4	4.9	4.5	3.6	4.0
Pulses	10.1	11.7	11.1	10.9	11.7	11.8	12.5	13.3	13.1	13.3	15.9
Total	63.2	74.0	81.0	103.0	118.1	138.1	155.0	189.0	202.9	202.2	237.4
Oilseeds	5.5	6.7	7.3	8.3	8.9	11.4	13.9	21.9	21.2	23.2	28.9
Sugarcane	55.3	80.3	109.2	128.1	153.3	174.9	196.4	258.4	292.4	277.0	325.8
Cotton	3.9	4.8	5.4	5.9	6.8	7.5	8.4	12.2	10.8	16.0	28.1
Jute	3.9	4.4	5.7	5.5	5.2	6.4	8.9	8.1	9.6	10.1	10.3

Source: Sury M M (2013): Five Year Plans of India, New Century Publications, New Delhi

Agricultural production has two components food grains and non-food grains. The former contributes approximately two-thirds of total agricultural production. In the Index Number of agricultural Production (triennium ending 1981-82 =100), the weights assigned to food grains and non food grains are 62.9 and 37.1 respectively. The most important component in the food grains category is rice (weight 29.7) followed by wheat (weight 14.5). In non- food grains category, oilseeds constitute the most important group (weight 12.6). Sugarcane carries a weight of 8.1 while cotton carries a weight of 4.4

As far as foodgrains output in concerned, the total production increased from 50.8 million tonnes in 1950-51 to 187.0 million tonnes in the Eighth plan and further to 202.9 million tonnes in the Ninth Plan. However, because of drought conditions in the first year of the Tenth Plan 2002-03, the food grains output declined to 174.8 million tones but again rose to 213.2 million tones in 2003-04. Production of wheat which averaged only 9.7 million tonnes per annum in the Second Plan and 11.1 million tonnes per annum in the Third Plan rose to 25 million tonner per annum in the Fourth plan. The momentum has been consistently maintained with wheat production averaging 84.4 million tonnes per annum in the Eleventh Plan. Wheat production is expected to touch the record level of 84.4 million tonnes in 2007-2012. Rice production has also picked up considerably since 1980s although there have been setbacks in some years. Rice production increased from 35.1 million tonnes in Third Plan to 97.03 million tonnes in Eleventh Plan. Rice production in 2007-12 estimated at a record level of 106.02 million tonnes. As is clear from Table 1.1 jowar and bajra have shown erratic trends over the planning period as a whole with production remaining almost stagnant for most of the time. Maize also exhibited stagnant production levels for a considerable period of planning. However, the introduction of hybrid maize seeds in recent years has suddenly pushed up production. Maize production which was 15.1 million tonnes in 2002-07 rose to as high as 22.3 million tonnes in 2007-12 and is expected to be 23.2 million tonnes in 2007-12. It is only in 2010-11 that this level was breached and the actual production of pulses rose to 18.2 million tonnes. It is estimated to touch the record level of 19.8 million tonnes in 2007-12.

As far as the non-food grains group is concerned, the production of oilseeds rose considerably in the latter half of the 1980s, in certain years of 199-s and the first decade of the present century. For instance, oilseeds production increased from 12.7 million tonnes in 1987-88 to 18.6 million tonnes in 1990-91 and further to a level of 24.7 million tonnes in 1998-99. However, it fell thereafter and stood at only 14.8 million tonnes in 2002-03 but rose subsequently. It was 24.9 million tonnes in 2009-10 and touched the record level of 32.5 million tonnes in 2002-2007. In 2007-12, the production of oilseeds declined to 30.9 million tonnes and is estimated at 33.0 million tonnes in 2013-14. However, just like pulses, *there is a large gap between demand and supply forcing the country to import large quantities of edible oils.*

Production of cotton which averaged 12.2 million tonnes per annum in the Eight Plan and 10.1 million tonnes per annum in the Ninth Plan rose significantly in later years due to the widespread adoption of Bt cotton in 2002. From an average annual production of 16.0 million tonnes in the Tenth Plan period, the production rose to 34.2 million tonnes in 2002-07 and is estimated at 35.6 million tonnes in 2007-12. *Now almost 90% of cotton area is covered under Bt cotton.*

In the non food grains group, jute has shown a slow and halting progress during the entire period of planning. As far as sugarcane production is concerned, it registered a more or less steady growth during the four decades period 1952-53 to 2002-03, but fell sharply in 2003-04 and 2004-05. In 2006-07, sugarcane production attained a high level of 355.5 million tonnes but declined in subsequent years. In 2009-10, it was a only 292.2 million tonnes but rose to the record level of 361.0 million tonnes in 2002-07. The production of sugarcane is estimated at 345.9 million tonnes in 2007-12.

**Table 1.2**  
**Yield per Hectare of Major Crops**  
*(kgs per hectare)*

Crop	1950-51	1960-61	1980-81	1990-91	2000-01	2011-12	2012-13
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

Rice	668	1,013	1,336	1,740	1,901	2,372	2,462
Wheat	655	851	1,630	2,281	2,708	3,140	3,118
Jowar	353	533	660	814	764	962	862
Bajra	288	286	458	658	688	1,171	1,214
Maize	547	926	1,159	1,518	1,822	2,478	2,552
Pulses	441	539	473	578	544	694	786
Total	552	710	1,023	1,380	1,626	2,059	2,125
Oilseeds	481	507	532	771	810	1,135	1,169
Cotton	88	125	152	225	190	491	482
Jute	1,043	1,049	1,245	1,833	2,026	2,389	2,350

Table reveals increases in yield per hectare. This table shows that over the period 1950-51 to 2012-13, *yield per hectare of all food grains has increased by more than three-and-a-half times from 552 kgs per hectare in 1950-51 to 2,125 kgs per hectare in 2012-13*. If we focus on the entire period of planning, the most significant increase has been recorded by wheat with its yield increasing from 655 kgs per hectare in 1950-51 to as high as 3,118 kgs per hectare in 2012-13. Jowar and Bajra recorded much slower rates of growth in productivity. Most disappointing has been the performance of pulses. In fact, productivity of pulses in 2000-01 was at the same level as 1960-61. However, the productivity rose somewhat to 694 kgs per hectare in 2011-12 and further to 786 kgs per hectare in 2012-13.

As noted earlier, *due to the adoption of hybrid maize varieties and Bt cotton in recent years, the productivity of maize and cotton has increased substantially*. As is clear from Table 1.2, the productivity of maize rose from 1,822 kgs per hectare in 2000-01 to 2,478 kgs per hectare in 2011-12. Over the same period, the productivity of cotton rose from 190 kgs per hectare to as high as 488 kgs per hectare. The most disappointing has been the performance of pulses. If we consider the entire period planning, we find that *the average yield per hectare of pulses has grown by less than one per cent annually, an average, since the 1950s*. The productivity of oilseeds rose from 481 kgs per hectare in 1950-51 to 810 kgs per hectare in 2000-01 and 1,169 kgs per hectare in the year 2012-13.

### International Comparisons of India's Agricultural Productivity

Despite the substantial improvements in the productivity in case of major crops the productivity trends in India is far below those obtained in many developed nations. Table 1.3 gives the productivity of some crops in India and other countries.

**Table 1.3**  
**Productivity of Land in Some Countries, 2012**

<i>Rice/Paddy</i>	<i>(kgs/hec)</i>	<i>Wheat</i>	<i>(kgs/hec)</i>	<i>Maize</i>	<i>(kgs/hec)</i>	<i>Groundnut (in shell)</i>	<i>(kgs/hec)</i>	<i>Sugarcane</i>	<i>(kgs/hec)</i>
Egypt	9,702	China	4,995	USA	7,744	China	3,575	Argentina	71,429
<b>India</b>	<b>3,591</b>	France	7,599	France	9,085	USA	4,699	Brazil	71,304
Japan	5,391	<b>India</b>	<b>3,173</b>	<b>India</b>	<b>2,057</b>	Vietnam	2,134	China	68,811
Myanmar	4,049	Iran	1,971	Argentina	7,343	<b>India</b>	<b>1,179</b>	<b>India</b>	<b>87,200</b>
China	6,744	Pakistan	2,714	Philippines	2,856	Brazil	3,089	Gautemala	1,25,164
Thailand	3,000	UK	6,657	China	5,956	Japan	2,410	Colombia	1,14,983
USA	8,349	Egypt	6,516					Egypt	
<b>World</b>	<b>4,395</b>	<b>World</b>	<b>3,115</b>	<b>World</b>	<b>4,494</b>	<b>World</b>	<b>1,676</b>	<b>World</b>	<b>68,854</b>

## **Causes of Low Productivity**

There is no single reason for low productivity in agriculture in India. The causes of low productivity are as given below:

### **1. General Causes**

#### **(i) Excessive Pressure of Population on Land**

The heavy pressure of population on land is caused by the limited growth of employment opportunities in the non-agricultural sector for rural people and rapid growth of rural population. The increasing population is largely responsible for subdivision, fragmentation of land holdings that results into low productivity of land.

#### **(ii) Social Environment**

The social environment in terms of illiteracy, superstitious attitude and unresponsive behavior towards the new technology is also a major limiting factor to the improvement in the agricultural productivity. Further, the human factor engaged in the agriculture sector is most unsatisfactory due to poor health and hygiene conditions.

#### **(iii) Land Degradation**

The increased land degradation is mainly due to the increased use of chemical fertilizers, and low quality of canal water. This has resulted into loss of nutrients in the land and fall in the productivity levels.

#### **(iv) Lack of General Infrastructural Facilities**

The economic rural infrastructural facilities are inadequate in terms of availability of road, transportation facilities, electricity and power.

#### **(v) Inadequate Agricultural Capital Formation:**

Agriculture sector cannot make substantial contribution to the economic development of the country. The capital formation in the agriculture sector particularly the public capital formation in the agriculture sector is declining. The depressed capital formation has resulted into low agriculture productivity.

### **2) Institutional Causes**

#### **(i) Defective Land Tenure System**

The exploitative character of land tenure system in the form of Zamindari system has reduced the capacity, incentive and motivation of the cultivators to improve productivity. The exploitative practices in terms of excessive rent, insecurity of land tenure and no land ownership rights causes cultivators to share large portion of output with land owners. This has resulted in lack of resources and interest of farmers to introduce technological improvements and thus increase productivity.

#### **(ii) Uneconomic Land Holdings**

The average land-holding in India is not only small in size but split into pieces and scattered due to sub-division and fragmentation of land. The average land-holding is just 2.3 hectares according to the latest agriculture census in India. This has resulted into the uneconomic land holding making investments in improved technology and inputs unviable.

#### **(iii) Inadequate Credit and Marketing Facilities**

There has been a drastic reduction of institutional credit for agriculture. It is evident from the fact that the percentage share of agricultural credit, in the total credit of all scheduled commercial banks since the early 1990s has fallen compared to the levels, reached in the 1980s. Banks and financial institution are reluctant to provide financial assistance at fair rate of interest to farmers. The share of direct financing of farmers has declined tremendously. Thus, a large section of farmers has to depend upon non-institutional credit system (like moneylenders, and traders) that charge exorbitant rate of interest.

### **3) Technical Causes**

#### **Technological Backwardness**

Most of farmers use traditional agriculture methods mainly due to paucity of finance. The use of high-yield variety seeds and fertilizers is very limited. Government has withdrawn from provisioning of HYV seeds developed in laboratory to the farms. Farmers have to pay exorbitant prices to the private suppliers for the low quality seed variety which has adverse consequences on the agricultural productivity.

#### **Increasing Input Cost**

The increase in the input cost due to reduction in subsidies for fertilizers and better seeds and increase in cost of power are responsible for the deceleration in the agriculture growth in the recent years.

#### **Inadequate Irrigation Facilities**

The vast proportion of cultivable land in India is rain-fed. Further, the infrastructure for irrigation is highly underdeveloped due to defective management as revealed by the fact that only 52.4 percent of the land was irrigated in the year 2003. As rainfall is often insufficient, uncertain and irregular, it leads to low productivity. Further, the Government's expenditure on irrigation coverage and flood control has witnessed a declining trend during the reform period.

#### **Measures to Improve Productivity**

Government has initiated various measures to overcome the problem of low agriculture productivity but the following measures are required to strengthen the agriculture development:

##### **1) Effective Implementation of Land Reforms**

The land reforms in terms of Zamindari abolition, ceiling and redistribution of land tenurial relations, consolidation of small and scattered holdings, minimum wages of landless labor etc needs to be effectively implemented. This will help to provide incentives and motivation to farmers to improve productivity and investment in agriculture sector.

##### **2) Greater Usage of Modern Technology**

The components of modern technology in terms of improved seeds, fertilizers and pesticides have to be made available easily to the farmers at fair prices. Farmers are required to be given training about the usage of these components especially fertilizers and chemical pesticides. The services of constant expertise, guidance and counseling about seeds sowing, time of sowing etc needs to be developed.

##### **3) Better Credit Facilities**

The timely and sufficient financial assistance is the precondition to improve usage of better technology. Government had launched various schemes and institutions to improve agricultural credit such as establishment of cooperative banks, rural branches of nationalized banks, grameen banks etc. However, there is a lack of coordination under the multi-agency credit system.

##### **4) Restructuring Cropping Pattern**

The scientific research has mainly focused upon two major crops viz, wheat and rice. The breakthrough in terms of improved varieties of seeds has to be explored for other crops.

##### **5) Development of Irrigation Facilities**

The main obstacle in the exploitation and use of modern technology is the water shortage. The inter-linking of river projects needs to be implemented speedily to reduce the ill-effects of floods and droughts. The greater use of dry and commercial cropping that requires lesser use of water should be encouraged. The surface-irrigation and water-pumping arrangements should be increased.

## 6) Development of Research Institutes

The research labs and agricultural universities have to be established, upgraded and sustained. The problems such as lack of resources, equipments and experts in these institutes need to be addressed immediately. The weakening of link between laboratory research and application on farm has to be minimized

## 7) Betterment of Warehousing and Distribution Services

The warehousing facilities are so under-developed that it renders the stored goods unsuitable for consumption. It is paradoxical that the country suffers from deficient food supplies in many regions and the food grains are rotten in warehouses.

## 8) Population Control

The continuous growth in the population especially in the rural areas is the major cause of uneconomic land-holding which limits the usage of modern technology. Thus the family planning and population control remain national priority.

## 9) Introduction of Co-Operative Farming and Marketing

The co-operatives in India are suffering due to strict Government controls and legislations. The co-operative should be given greater operational freedom and allowed to enlarge their activities including banking and marketing of agro products.

## Conclusion

From the above evidence we can conclude that overall performance of the Indian agriculture growth and production has shown the significant change in the last three decades. It reveals that the agriculture major crop has increase over the period of time. An average of 94.49 million tones of rice is produced annually which is higher than production of wheat, coarse cereals and pulses taken individually. However, it is less than annually average production of all food grain (227.48million tonnes). Nonetheless, the variation in annual production of all food grains is significant standard Deviation value obtained of rice, cereals, wheat and pulses have increased comparatively over the last few years. This paper is mainly depends on the secondary sources of the different agriculture departments and planning commission.

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