

# An Economic Analysis of Food Grains and Non-food Grains Production in India, 2006-07 to 2015-16

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## Abstract

**Background:** India is the world's largest producer of many food grains and non-food grains Production. India's population is growing faster than its ability to produce rice and wheat. Other recent studies shows India can easily feed its growing population, and produce wheat and rice for global exports, if it can reduce food staple spoilage, improve its infrastructure and raise its farm productivity to those achieved by other developing countries such as Brazil and China. **Methods:** The present study discusses an economic analysis of agricultural production in India. Data on important variables like area, production, and yield per hectare were compiled for the period 2006 - 07 to 2015- 16 from various published sources. The analysis of data reveals that the area under cultivation and production of selected food grains and non-food grains in India has undergone significant changes over time. **Findings:** The result found that the overall area under cultivation and production of selected food grains are declining and yield per hectare was continuously increasing over the period of 2006-07 to 2015 - 16. Similarly, the performance of non- food grains in terms of area and output were not impressive during the study period. The increase in crop yield has been a major factor for accelerating production in the country since the late 1960s. The use of modern varieties, irrigation and fertilisers were important factors that ensured higher growth in food grains and non-food grain production. However, technological and institutional support for a few crops like rice and wheat brought significant changes in crop area and output. Public investment in irrigation and other rural development infrastructures together with improved crop production techniques such as high yielding variety seeds, chemical fertilizers, plant protection measures, etc. have significantly helped to expand the food grains and non-food grains production.

**Key Words:** Food Grains, Non-food Grains, Production, Productivity, Yield

## **Introduction**

The performance of the agriculture sector influences the growth of the Indian economy. Agriculture sector has been a way of life and continues to be the single most important livelihood of the masses. Agricultural policy focus in India across decades has been on self-sufficiency and self-reliance in food grains production. Considerable progress has been made on this front. The food-grains production rose from 52 million tonnes in 1951-52 to 259.32 million tonnes in 2011-12. But it marginally declined to 255.6 million tonne in 2012-13. The share of agriculture in real GDP has fallen to 14 per cent in 2014-15 given its lower growth rate relative to Industry and Service. Achieving minimum agricultural growth is a pre-requisite for inclusive growth, reduction of poverty levels, development of the rural economy and enhancing of farm incomes. The growth rate of agriculture production is generally judged by the performance of food grains and non-food grains production. From these both items of agriculture production of food grain is more significant due to two reasons. Firstly, it provides the base for subsistence by supplying basic food items and secondly, it is the only group of agricultural produce where —Green Revolution‖ was introduced firstly and more successfully. Its importance has also increased due to the inception of World Trade Organization (WTO) in 1995 and therefore in the present study we shall concentrate our self over the production. At the time of independence agriculture occupied the most dominant place in the Indian economy by providing livelihood

to about 70 per cent of population and contributing about 48.6 per cent of GDP (Sharma, P.N., 2005). After the introduction of Green Revolution, the scene has completely changed about the Indian agriculture has transformed from food shortage to self-reliance. This has become possible because of technological changes as well as the Government initiatives in form of various programme.

The new method of agricultural practice brought a drastic change in the productivity and production. More and more agricultural land are brought under cultivation with the help of improved irrigation facilities (with the help of assured means of irrigation) cheaply available chemical fertilizers and supply of high yield varieties of seeds in the market. Farm mechanization has also shortened the period of ploughing, sowing and harvesting process of agriculture. The implementation of land reform has further added a new dimension in Indian agriculture. Therefore the successful implementation of Green Revolution and Land Reform not only increases the productivity but also increases the area under cultivation that paved the way for a higher growth of the agricultural sector. Rice, Wheat, Pulses and also total food grains together and try to draw the inferences. Based on these inferences we will examine the trends as well as causes, opportunities and challenges, and make appropriate projections. Therefore, we take up the data at an aggregate level and also most of important food grain producing states. Further climate change has emerged as an important determinant, particularly in the recent past. In India before economic reforms government was providing a lot of subsidies over the inputs that made the purchase of inputs affordable for the farmer which helps in fighting against the climate change. But after the economic reforms high rise in the prices of inputs of agricultural production has made it difficult for the farmers to purchase the inputs in right amount and vulnerability of agriculture to climate change has increased and it is expected that agriculture sector in India will be negatively affected. (Narain, Ghosh, Sexena, Parikh, Soni, 2009)

The impact of climate change as witnessed in recent times has immense potential to adversely affect agriculture in this country in a variety of ways. As a large part of the arable land in India are rains fed the productivity of agriculture depend on the rainfall and its pattern. Agriculture will be adversely affected not only by subsidized rate that resulted in form of a revolution in the Indian agriculture. The cheaper availability of factors of production supposed to increase the consumption of fertilizers and land under irrigation facilities so as to increase the total food grains production by increasing the yield and area under cultivation. But after the adoption of new economic policy, it has been assumed by the government that now the Indian agriculture is maintained enough to survive on her own feet. Further the reduction in subsidiary causes to increase the prices of agricultural inputs. This ultimately adversely effected the food grains production and productivity.

### **Objectives**

- (i) To analyse the trends of food grains and non-food grains in India
- (ii) To study of percentage changes in area under cultivation and production of food grains and non-food grains in India

### **Methodology**

The present study discusses an economic analysis of agricultural production in India. Data on important variables like area, production, and yield per hectare were compiled for the period of 2006-07 to 2015-16 from various published sources. The analysis of data reveals that the area under cultivation and production of selected food grains and non-food grains in India has undergone significant changes over time. Percentage, average and compound growth rate has been used to derived the food grains and non-food grains growth in India.

### **Food grains in India**

In India a great part of the new incomes generated by the process of economic growth is directed to food grains. The people start consuming better food. While increasing food grains production which provide have self-sufficiency of

food. A mismatch between the national food grain production and requirement has already crept into the system, which is further widening. The human population of India has increased to 1210.2 million at a growth rate of 1.76 per cent in 2011 over 2001 (1028.77 million) and is estimated to increase further to 1530 million by 2030 (census of India, 2011). On the other hand our national food grain production for past 3-4 years is hovering around 234 million tonnes. This means that per capita food grain production is only about 193 kg per year. There are projections that demand for food grains would increase from 234 million tonnes in 2009-10 to 345 million tonnes in 2030 (GOI, 2009). Hence in the next 20 years, production of food grain needs to be increased at the rate of 5.5 million tonnes annually. With ground water tables declining, there are growing pressure to increase the yield. The key factor behind high yield growth could be the developments of new technology that will produce higher yield per hectare, and fertilizer remains a key player in the most important task as it has been in the past. However, fertilizer application should be optimum in quantity to meet the crop's nutrient requirement fully so as to achieve the set yield target. The information about the annual growth in the Area, Production and yield of major food grains production in rice, wheat, cereals and pulses particular is given in the following table.1

**Table 1** indicates the area, yield and production of major selected food grains over the decades. The record of rice is the highly compare with area, yield and production of other major selected crops. A record of area under rice cultivation decreased from 43.8 million hectares to 43.4 million hectares over the decades while 93.4 million tons as compared to 104.3 million tons produced by rice of the country, viz. from 2131 kg per hectare to 2404 kg per hectare. Which is the clearly expressed the increasing productivity of rice of the country, whereas the production of wheat increasing from 75.8 million tons to 93.5 million tons during 2006 to 2016 under area from 28 million hectare to 30 million hectare therefore 2707 kg per hectare to 3093 kg per hectare. Yield per hectare in the case of cereals 1182 kg to 1596 kg, the cereals produced from 33.9 million tons under 28.7 million hectares to 37.9 million tons under 23.8 million hectares of the decade. In the same way though the total production of pulses 14.2 million tons to 16.5 million tons between 2006-07 to 2015-16 is under cultivate by 22.3 million hectares to 25.3 hectares, including increase in 612 kg per hectare to 652 kg per hectare. The above data indicates that effectively increasing productivity of rice and cereal of food grains from the period of 2006-07 to 2015-16 in our country. The production of food grains is the key factor behind high yield growth could be the developments of new technology that will produce higher yield per hectare, and fertilizer remains a key player in the most important task as it has been in the past. However, fertilizer application should be optimum in quantity to meet the crop's nutrient requirement fully so as to achieve the set yield target.

### Non-Food grains in India

Indian agriculture has been the source of supply of raw materials to our leading industries. Cotton and jute textile industries, sugar, flour mills and plantations all these depend on agriculture directly. There are many other industries which depend on agriculture in an indirect manner. Many of our small-scale and cottage industries like handloom weaving, oil crushing, rice husking, etc. depend upon agriculture for their raw materials and together they account for 50 per cent of income generated in the manufacturing sector in India. The information about the annual growth in the Area, Production and yield of major non- food grains production in groundnut, cotton, sugarcane, tea and jute particular is given in the **table-2**.

**Table 2** shows decline the area, yield and production of major selected non-food grains over the decades. An adverse effect of groundnut, cotton, jute is the highly compare with area and yield kg per hectare compared from opening to end year is area under cultivation were diminishing yield per hectare is increasing in other major selected crops. A record of area under groundnut cultivation decreased from 5.6 million hectares to 4.6 million hectares over the decades while 4.9 million tons as compared to 6.8 million tons produced by groundnut of the country, viz. from 866 kg per hectare to 1486 kg per hectare. Which is the clearly expressed the better utilisation of factor used in groundnut production of the country, whereas the production of sugarcane increasing from 288 million tons to 348 million tons during 2006 to 16 under area from 5.2 million hectare to 5 million hectare therefore 69022 kg per hectare to 71095 kg per hectare. Yield per hectare in the case of jute 2170 kg to 2399 kg, the jute produced from 973.1 million tons under 0.9 million hectares to 1233.1 million tons under 0.8 million hectares of the decade. In the same way though the total production of cotton 355.5 million tons to 352.2 million tons between 2006-7 to 2015-16 is under cultivate by 9.1 million hectares to 11.9 hectares, including increase in 421 kg per hectare to 432 kg per hectare. The yield of tea



production grew by 22.6 million tons to 30.2 million tons from 2006-07 to 2015-16 and yield of kg per hectare change from 1716 kg to 2176 kg. The produce of cotton by maximum rainfed region or backward region therefore negative fact of area and production also the cost of fertilizers, seeds irrigation facilities etc. has increased and it becomes difficult for the small farmers to purchase it and consequently total cotton production declined.

### Growth Rate of Food Grains and Non-Food Grains in India

**Table 3** represents the percentage Change in Area under Cultivation of Food Grains and Non-Food Grains Production in India during 2006-07 to 2015-2016. The annually percentage change in four items of area under cover food grains production and five items of non-food grains, only the pulses production registered 13.4 per cent is high growth in area under cultivation during the period of 2010 – 11, same time the positive change in all crops of food grains during this periods. The area under cultivation for the non-food grains production of sugarcane grown by 22.6 per cent during 2006 to 2007 which is the highest rate of growth among the other items of non - food grains production. The growth rate of groundnut production has grown by 17.2 per cent on 2013-14. The other two items namely rice and wheat grown by 0.76 and 2.11 per cent respectively in the reform period. The table also indicates that the production of area under cultivation of food grains and non-food grains in India were negative growth during 2015-1016 except pulses. The high percentage change in area under cultivation is determined by land reforms, credit availability of farmers and profit of the farm production.

The percentage Change in production of Food Grains and Non-Food Grains in India during 2006-07 to 2015-2016 explained in the **table-4**. During period of 2010 – 11, growth rate on 29.4 and 24.4 per cent change in food grains of cereals and pulses production is observed which its due to minimized the dependence on import of pulses. While the same period 88.9, 37.4 and 17.1 per cent has grown by non-food grains of groundnut, tea and cotton production. The 9.7 percentage change in growth of rice production during 2011-12 which was comparison to high in other period. Another massive change in 106.6 percent change in non-food grains of groundnut has grown during the period of 2013-14 due to higher prices, while in the same period sugarcane were decline to 4.3 per cent per annum. During the period of 2009 – 10 declined 10.2 per cent of rice production due to hike in the price of fertilizer and other inputs.

The **table-5** portrays the compound annual growth rate of Area, Production and Yield of selected food grains and non-food grains in India. The percentage change in compound growth rate of area, production and yield from 2006-11 to 2011-16. The period 2006-07 to 2010-11 compound growth rate of production and yield of food grain in cereals is greater than the growth rate in the 2010-11 to 2015-16. The mass growth rate of cotton production, yield and area of non-food grains production in 2006-07 to 2010-11 is 11.22, 10.26 and 0.84 per cent respectively. While in the period of 2010-11 to 2015-16, which is marginally decline like 0.55, 2.35 and 2.82 per cent respectively. In area, production and yield of all food grains and non-food grains in period of 2006-07 to 2010-11 were grown to compare in period of 2010-11 to 2015-16 this was indicate the agro sector massive challenges future periods.

### Findings

The area under rice cultivation decreased from 43.8 million hectares to 43.4 million hectares over the decades while 93.4 million tons as compared to 104.3 million tons produced by rice of the country, viz. from 2131 kg per hectare to 2404 kg per hectare. A record of area under groundnut cultivation decreased from 5.6 million hectares to 4.6 million hectares over the decades. The production of area under cultivation of food grains and non-food grains in India were negative growth during 2015-1016 except pulses. During the period of 2009 – 10 declined 10.2 per cent of rice production due to hike in the price of fertilizer and other inputs. In area, production and yield of all food grains and non-food grains in period of 2006-07 to 2010-11 were grown to compare in period of 2010-11 to 2015-16 this was indicate the agro sector massive challenges for future periods

### Policy implications

- The government to ensure credit with low interest rate of farmers which was marginally increasing farmers purchase of land, machinery, equipment, etc.
- In today Climate change is very important factor to affecting agriculture production, therefore the central and state government should be steps taken up reliability remuneration of the farmers.
- Stimulate drip irrigation and watershed development programmes of the country (soil and water conservation)

- To better warehousing and market facility for farmers, which is creates the protection of produced food grains.
- The younger generation are willing to enter in agriculture, it is creates to be best use of technology in faming activities.
- The industrial sector provide adequate price of raw material from agriculture and the government should purchase its then provide industry.
- The government also encourage agro trade relationship on within the state and outside of the country.

**Conclusion**

Indian agriculture is considered as gamble of monsoon because of more than 50 per cent agriculture depends upon rainfall. Government of India initiated numbers of project of irrigation over the year. But still, major Indian agriculture depends upon Monsoon. The cheaper availability of factors of production supposed to increase the consumption of fertilizers and land under irrigation facilities so as to increase the total food grains production by increasing the yield and area under cultivation. . The adverse effect on production and productivity of rice and wheat is not only reduction on subsidiary on agricultural inputs but also the overall declined in amounts of rain fall and shifts in the timing of the rain fall. Any change in rain fall patterns poses a serious threat to agriculture and therefore to the economy and food security.



**Table-1: Area, Production and Yield of Major Food Grains in India, 2006-07 to 2015-2016**

Year	Rice			Wheat			Cereals			Pulses		
	Area (MH)	Production (MT)	Yield (Kg/Hec)	Area (MH)	Production (MT)	Yield (Kg/Hec)	Area (MH)	Production (MT)	Yield (Kg/Hec)	Area (MH)	Production (MT)	Yield (Kg/Hec)
2006-07	43.8	93.4	2131.0	28.0	75.8	2708.0	28.7	33.9	1182.0	23.2	14.2	612.0
2007-08	43.9	96.7	2202.0	28.0	78.6	2802.0	28.5	40.8	1431.0	23.6	14.8	625.0
2008-09	45.5	99.2	2178.0	27.8	80.7	2907.0	27.5	40.0	1459.0	22.1	14.6	659.0
2009-10	41.9	89.1	2125.0	28.5	80.8	2839.0	27.7	33.6	1212.0	23.3	14.7	630.0
2010-11	42.9	96.0	2239.0	29.1	86.9	2988.0	28.3	43.4	1531.0	26.4	18.2	691.0
2011-12	44.0	105.3	2393.0	29.9	94.9	3177.0	26.4	42.0	1590.0	24.5	17.1	699.0
2012-13	42.8	105.2	2461.0	30.0	93.5	3117.0	24.8	40.0	1617.0	23.3	18.3	789.0
2013-14	44.0	106.7	2424.0	31.2	95.9	3075.0	25.7	43.3	1677.0	25.2	19.3	764.0
2014-15	43.9	105.5	2390.0	31.0	86.5	2872.0	24.2	42.9	1729.0	23.1	17.2	744.0
2015-16	43.4	104.3	2404.0	30.2	93.5	3093.0	23.8	37.9	1596.0	25.3	16.5	652.0

Source: Handbook of Statistics on Indian Economy, Reserve Bank of India

**Table-2: Area, Production and Yield of Major Non-Food Grains in India, 2006-07 to 2015-2016**

Year/Non-Food Grains	Groundnut			Sugarcane			Tea			Cotton			Jute		
	Area (MH)	Production (MT)	Yield (Kg/Hec)	Area (MH)	Production (MT)	Yield (Kg/Hec)	Area (MH)	Production (MT)	Yield (Kg/Hec)	Area (MH)	Production (MT)	Yield (Kg/Hec)	Area (MH)	Production (MT)	Yield (Kg/Hec)
2006-07	5.6	4.9	866.0	5.2	288.0	69022.0	0.6	22.6	1716.0	9.1	355.5	421.0	0.9	973.1	2170.0
2007-08	6.3	9.2	1459.0	5.1	262.0	68877.0	0.6	25.9	1706.0	9.4	348.2	467.0	1.0	987.0	2101.0

2008-09	6.2	7.2	1163.0	4.4	262.3	64553.0	0.6	22.3	1679.0	9.4	285.0	403.0	0.9	972.8	2071.0
2009-10	5.5	5.4	991.0	4.2	289.6	70020.0	0.6	24.0	1711.0	10.1	292.3	403.0	0.9	991.2	2349.0
2010-11	5.9	8.3	1411.0	4.9	302.0	70091.0	0.6	33.0	1726.0	11.2	342.4	499.0	0.9	966.7	2192.0
2011-12	5.3	7.0	1323.0	5.0	314.0	71668.0	0.6	35.2	1956.0	12.2	361.0	491.0	0.9	1095.5	2283.0
2012-13	4.7	4.7	996.0	5.0	318.2	68254.0	0.6	34.2	2027.0	12.0	341.2	486.0	0.9	1135.1	2281.0
2013-14	5.5	9.7	1750.0	5.0	304.5	69839.0	0.6	35.9	2121.0	11.7	352.1	532.0	0.9	1208.8	2449.0
2014-15	4.7	7.4	1400.0	5.1	327.0	69859.0	0.6	34.8	2100.0	13.1	362.3	461.0	0.8	1197.2	2550.0
2015-16	4.6	6.8	1486.0	5.0	348.0	71095.0	0.6	30.2	2176.0	11.9	352.2	432.0	0.8	1233.1	2399.0

Source: Handbook of Statistics on Indian Economy, Reserve Bank of India



Table-3

Percentage Change in Area under Cultivation of Food Grains and Non-Food Grains Production in India, 2006-07 to 2015-2016

Year	Food Grains				Non-Food Grains				
	Rice	Wheat	Cereals	Pulses	Groundnut	Sugarcane	Tea	Cotton	Jute
2006-07	0.3	5.7	-1.2	-0.9	-16.6	22.6	1.8	5.3	4.4
2007-08	0.2	0.2	-0.8	1.9	11.9	-1.7	1.8	3.0	2.1
2008-09	3.7	-1.0	-3.6	-6.5	-2.1	-12.6	0.0	0.0	-6.2
2009-10	-7.9	2.6	0.8	5.4	-11.0	-5.4	0.0	7.7	1.1
2010-11	2.2	2.1	2.4	13.4	6.9	16.7	-3.4	11.0	-4.4
2011-12	2.7	2.7	-6.8	-7.3	-10.2	3.3	0.0	8.4	3.4
2012-13	-2.9	0.5	-6.3	-4.9	-10.3	-0.8	0.0	-1.6	-3.3
2013-14	2.8	4.0	3.7	8.5	17.2	0.2	1.8	-2.4	-2.3
2014-15	-0.2	-0.7	-5.9	-8.4	-15.2	2.6	0.0	11.9	-4.7
2015-16	-1.1	-2.4	-1.5	9.4	-2.8	-3.7	0.0	-9.3	-2.5

Source: Handbook of Statistics on Indian Economy, Reserve Bank of India

Note: (Present Value-Past Value)/Past Value\*100

Table-4

Percentage Change in Production of Food Grains and Non-Food Grains in India, 2006-07 to 2015-2016

Year	Food Grains				Non-Food Grains				
	Rice	Wheat	Cereals	Pulses	Groundnut	Sugarcane	Tea	Cotton	Jute
2006-07	1.7	9.3	-0.4	6.1	-39.2	5.1	22.3	26.4	2.5
2007-08	3.6	3.6	20.1	3.9	88.9	-9.0	14.4	-2.1	1.4
2008-09	2.6	2.7	-1.7	-1.3	-21.9	0.1	-13.9	-18.1	-1.4
2009-10	-10.2	0.1	-16.2	0.6	-24.3	10.4	7.8	2.6	1.9
2010-11	7.7	7.5	29.4	24.4	52.3	4.3	37.4	17.1	-2.5
2011-12	9.7	9.2	-3.2	-6.3	-15.8	4.0	6.7	5.5	13.3
2012-13	-0.1	-1.4	-4.7	7.3	-32.5	1.3	-2.8	-5.5	3.6
2013-14	1.3	2.5	8.1	5.0	106.6	-4.3	4.9	3.2	6.5
2014-15	-1.1	-9.7	-1.0	-10.9	-23.8	7.4	-3.0	2.9	-1.0
2015-16	-1.1	8.1	-11.5	-4.0	-8.5	6.4	-13.4	-2.8	3.0

Source: Handbook of Statistics on Indian Economy, Reserve Bank of India

Note: (Present Value-Past Value)/Past Value\*100



Table-5

**Compound Annual Growth Rates of Area, Production and Yield of Selected Food grains and Non Food grains in India in %**

Year / Agricultural Production	2006-07 to 2010-11			2011-12 to 2015-16		
	Area (MH)	Production (MT)	Yield (Kg/Hec)	Area (MH)	Production (MT)	Yield (Kg/Hec)
<b>Food Grains</b>						
Rice	-0.44	0.56	0.99	-0.28	-0.19	0.09
Wheat	0.76	2.76	1.99	0.25	-0.29	-0.53
Cereals	-0.26	5.05	5.31	-2.08	-2.02	0.08
Pulses	2.63	5.13	2.46	0.65	-0.74	-1.38
<b>Non Food Grains</b>						
Groundnut	0.84	11.22	10.26	-2.82	-0.55	2.35
Sugarcane	-1.07	0.95	0.31	-0.36	2.08	-0.16
Tea	-0.35	7.84	0.12	0.35	-3.05	2.15
Cotton	4.22	-0.75	3.46	-0.51	-0.50	-2.53
Jute	-1.54	-0.13	0.20	-2.57	2.40	1.00

**Source:** Handbook of Statistics on Indian Economy, Reserve Bank of India

**Note:**  $CAGR = (EV / SV)^{1/n} - 1$

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