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# GROWTH TRENDS OF FOOD GRAINS IN INDIA; YIELD, AREA AND PRODUCTION: AN ANALYSIS OF PRE AND POST AGRICULTURAL POLICY

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**ABSTRACT:** *The contribution and stability of an economy are reflected in the growth and trend of agricultural production, particularly in the case of food grains. The aim of this research is to assess the growth and trend of food grain production, area under cultivation, and yield per hectare in India prior to (1984–2000) and following the implementation of the new agricultural policy (2001–2016). Secondary data was obtained from the Reserve Bank of India's handbook of statistics on the Indian economy and government of India in order to estimate and compare the growth of food grain production, area, and yield. The study found that from 1455.4 lakh metric tonnes in 1984–1985 to 2098 lakh metric tonnes in 1999–2000, there was a significant increase in food grain production—a 44.15 percent increase. Food grain acreage has been steadily increasing, going from 1267 lakh hectares in 1984–1985 to 1231 lakh hectares in 1999–2000. This represents a decrease of -2.84 percent. From 1149 kg per hectare in 1984–1985 to 1704 kg per hectare in 1999–2000, food grain yields increased. The yield of food grains per acre rose by 48.3 percent during Period I. From 1626 kg per hectare in 2000–01 to 2056 kg per hectare in 2015–16, food grain yields increased. The yield of food grains per acre rose by 26.4 percent during World War II. There is a positive correlation between food grain yield, production, and area. In other words, variations in the area used for food grain cultivation over time led to variations in food grain yield and production per hectare. Therefore, the emphasis should be on growing the area by making use of suitable land, raising yield through agricultural research, training, and technical innovation, and accelerating the implementation of policies in India.*

**KEYWORDS**: *Production, Food grains, Area, Yield.*

## 1. INTRODUCTION

Agriculture makes a significant contribution to the Indian economy, accounting for over 17% of total GDP and employing more than 60% of the population. Agriculture is the primary source of income for approximately for 58 percent of India's population. On a sector-by-sector basis, agriculture and related sectors contribute a substantial share of GDP in India. The agricultural sector ensures food security and nutrition for India's vast population, as well as supplies massive amounts of raw materials for strengthening the country's industrial base and creating surpluses for export. Better irrigation systems, pre-monsoon rainfall, the introduction of new technologies, investment, mechanisation, seeds, pricing policies, and other factors all contributed to the massive increase in food grain and commercial crop production. Food grain production increased significantly from 1455.4 lakh metric tonnes in 1984–85 to 2098 lakh metric tonnes in 1999–00, as shown in Table 1. During period I, the production of food grains increased by 44.15 percent. The highest average yearly growth rate (21.07 percent) was found in 1988–89. The area under cultivation of food grains has remained relatively steady, rising from 1267 lakh hectares in 1984–85 to 1231 lakh hectares in 1999–00. In period I, this is a -2.84 percent drop. Food grain yields increased from 1149 kg per hectare in 1984–85 to 1704 kg per hectare in 1999–00. In period I, the yield per acre of food grains increased by 48.3 percent. The area, production, and yield of food grains all have a positive relationship. That is, the area under cultivation of food grains changed over time, resulting in changes in food grain production and yield per hectare. Food grain production increased significantly from 1968.1 lakh metric tonnes in 2000-01 to 2515.7 lakh metric tonnes in 2015-16, as shown in Table 5. During period I, the production of food grains increased by 27.8 percent.

The area under cultivation of food grains has remained relatively steady, rising from 1211 lakh hectares in 2000–01 to 1232 lakh hectares in 2015–16. In period I, this is a 1.2 percent pickup. Food grain yields increased from 1626 kg per hectare in 2000–01 to 2056 kg per hectare in 2015–16. In period I, the yield per acre of food grains increased by 26.4 percent. The area, production, and yield of food grains all have a positive relationship. That is, the area under cultivation of food grains changed over time, resulting in changes in food grain production and yield per hectare. The Indian government unveiled the New Agricultural Policy in July 2000. The government purposefully and consciously created this policy to promote the growth and development of agricultural production and productivity, thereby increasing income, employment, and living standards. This policy aimed to promote the agriculture sector's overall development. The goal of the policy was to promote the agriculture sector to attain more than 4% each year. Other goals include increasing input productivity, increasing value added per hectare, safeguarding the interests of impoverished farmers, modernising agricultural sectors, preventing environmental degradation, agricultural research and training, and removing bureaucratic barriers, among others. The new agricultural strategy aims to promote the ideals of sustainability in the agricultural sector by introducing economically feasible, technically sound, environmentally non-degrading, non-hazardous, and socially acceptable use of the country's natural resources.

## 2. LITERATURE REVIEW

Recent literature on the area, production, and yield of agricultural production of food grains is mainly concentrated in this study. Some recent contributions are presented below. Trends in India's Agricultural Growth and its Determinants," by Elumalai Kannan (2011) According to the study, India's cropping patterns have changed dramatically over time, with a clear shift away from food grain production and towards commercial crops. Cultivation of coarse cereals fell by 13.3 percent throughout the study period. The output and area of the pulses were not working properly during this time. Increased crop yields were aided by modern seed varieties, fertilisers, irrigation systems, and other factors. Praduman Kumar and Surabhi Mittal (2006), "Agricultural Productivity Trends in India: Sustainability Issues" The long-term viability of crop production is becoming more critical. The post-green revolution era is characterised by high input utilisation and a slowing rise in total factor productivity. increases in agricultural R&D spending, which boosts total factor output. Agriculture research and development receives a lot of focus in the Indian economy. In India, cropping patterns have evolved away from food grain production to commercial crop development. According to Sulochna Meena (2016), "Analysis of growth trends in the Indian agricultural sector". Food grain yields grew as a result of the use of high-quality seeds, higher fertiliser doses, plant protection agents, and irrigation systems. Careful planning and investment were required to bring the agricultural sector's productivity up to speed. After nearly achieving self-sufficiency in basic food production, Indian agriculture is becoming export-oriented, according to V.P.S. Arora's (2013) "Agricultural Policies in India: Retrospect and Prospect" study. India currently exports rice and wheat, as well as cattle goods, in addition to the conventional export commodities.

The direction of commerce is shifting as well. Although commerce with the region's neighbours continues to dominate, trading with OECD countries is becoming increasingly vital, particularly for high-value food exports. Research on "Agricultural Development in India Since Independence: A Research on Progress, Performance, and Factors," Amarnath Tripathi and A.R. Prasad (2009) As per this study, the agricultural workforce has shifted from cultivators to agricultural labourers, the number of uneconomic holdings is on the rise, the area under food crops has shifted to nonfood crops, and within food crops, the area under cereals has shifted to non-cereals, and the overall growth trend of agriculture, with the exception of forestry, has been declining since the WTO. Instability in the area has become a major element in production instability. Malik, Ruchi (2017), Growth, instability, and decomposition of food grains in India, Although the Indian economy is developing, it remains an agrarian economy because agriculture is the primary source of income for the vast majority of the population. The current study employed time series data from 2001–02 to 2015–16 to look at the area, production, and yield of food grains in India. The findings found that the increase in production was due to an increase in area or a combination of area and yield in India's food grains. Furthermore, the study found that the production of food grains has increased over time due to an increase in area under food grains, which has been supplemented by an increase in crop yield. Because it is not possible to increase the area in the long run, it is critical to adopt appropriate or alternative production technologies that will improve the productivity of food grains.

## 3. OBJECTIVE

To analyze the growth and trends in the production, area and the yield of food grains in before and after the new agricultural policy

## 4. METHODOLOGY

For the study, we have used secondary data to carry out the objectives of production, area under cultivation, and yield per hectare of food grains in India. The data on the area under cultivation (in lakh hectares), production of

crops (in lakh metric tonnes), and yield per hectare of food grains (kg/hectare) were collected from the Reserve Bank of India's handbook of statistics on the Indian economy and the Ministry of Agriculture and Farmers' Welfare of the Government of India. The data covered two distinct periods related to the before and after of agricultural policy in India: 1984–2000 and 2001–2016, respectively. Both periods need separate investigation, as from 1984 to 2016 in India. The average compound annual growth rate (CAGR) was used to estimate, compare, and compare the growth trend in the production, area, and yield per hectare of food grains before and after the new agricultural policy in India.

## 5. RESULTS AND DISCUSSION

As can be seen in the tables below, the study found that the yield per hectare of food grains, the area under cultivation of food grains, and the annual average growth rate of agricultural production before and after the new agricultural policy (2000)

**Table 1**
**Growth of Production, Area and Yield of Food Grains in India – 1984-85 to 1999-2000**

| *Year* | *Production* | *Simple Growth Rate* | *Area* | *Simple Growth Rate* | *Yield* | *Simple Growth Rate* |
|---|---|---|---|---|---|---|
| 1984-85 | 1455.4 | - | 1267 | - | 1149 | - |
| 1985-86 | 1504.4 | 3.37 | 1280 | 1.03 | 1175 | 2.263 |
| 1986-87 | 1434.2 | -4.67 | 1272 | -0.63 | 1128 | -4.000 |
| 1987-88 | 1403.5 | -2.14 | 1197 | -5.89 | 1173 | 3.989 |
| 1988-89 | 1699.2 | 21.15 | 1277 | 6.68 | 1331 | 13.470 |
| 1989-90 | 1710.4 | 0.66 | 1268 | -0.71 | 1349 | 1.352 |
| 1990-91 | 1763.9 | 3.13 | 1278 | 0.79 | 1380 | 2.298 |
| 1991-92 | 1683.8 | -4.54 | 1219 | -4.62 | 1382 | 0.145 |
| 1992-93 | 1794.8 | 6.59 | 1232 | 1.07 | 1457 | 5.427 |
| 1993-94 | 1842.6 | 2.66 | 1228 | -0.33 | 1501 | 3.020 |
| 1994-95 | 1915 | 3.93 | 1237 | 0.73 | 1546 | 2.998 |
| 1995-96 | 1804.2 | -5.79 | 1210 | -2.18 | 1491 | -3.558 |
| 1996-97 | 1994.3 | 10.54 | 1236 | 2.15 | 1614 | 8.249 |
| 1997-98 | 1931.2 | -3.16 | 1239 | 0.24 | 1552 | -3.841 |
| 1998-99 | 2036.1 | 5.43 | 1252 | 1.05 | 1627 | 4.832 |
| 1999-00 | 2098 | 3.04 | 1231 | -1.68 | 1704 | 4.733 |
| Average | 1754.4 | | 1245.2 | | 1409.2 | |

**Source:** Hand book of Statistics on Indian Economy, publication of RBI.

Food grain production increased significantly from 1455.4 lakh metric tonnes in 1984–85 to 2098 lakh metric tonnes in 1999–00, as shown in Table 1. During period I, the production of food grains increased by 44.15 percent. The highest average yearly growth rate (21.07 percent) was found in 1988–89. The area under cultivation of food grains has remained relatively steady, rising from 1267 lakh hectares in 1984–85 to 1231 lakh hectares in 1999–00. In period I, this is a -2.84 percent drop. Food grain yields increased from 1149 kg per hectare in 1984–85 to 1704 kg per hectare in 1999–00. In period I, the yield per acre of food grains increased by 48.3 percent. The area, production, and yield of food grains all have a positive relationship. That is, the area under cultivation of food grains changed over time, resulting in changes in food grain production and yield per hectare.

**Table 2**
**Categories of Food grain production in India -1984-85 to 1999-2000**

| *Year* | *Rice* | *Wheat* | *Coarse Cereals* | *Total Cereals* | *Pulses* | *Total Food grains* |
|---|---|---|---|---|---|---|
| 1984-85 | 583.4 | 440.7 | 311.7 | 1335.8 | 119.6 | 1455.4 |
| 1985-86 | 638.3 | 470.5 | 262 | 1370.8 | 133.6 | 1504.4 |
| 1986-87 | 605.6 | 443.2 | 268.3 | 1317.1 | 117.1 | 1434.2 |
| 1987-88 | 568.6 | 461.7 | 263.6 | 1293.9 | 109.6 | 1403.5 |
| 1988-89 | 704.9 | 541.1 | 314.7 | 1560.7 | 138.5 | 1699.2 |
| 1989-90 | 735.7 | 498.5 | 347.6 | 1581.8 | 128.6 | 1710.4 |
| 1990-91 | 742.9 | 551.4 | 327 | 1621.3 | 142.6 | 1763.9 |
| 1991-92 | 746.8 | 556.9 | 259.9 | 1563.6 | 120.2 | 1683.8 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 1992-93 | 728.6 | 572.1 | 365.9 | 1666.6 | 128.2 | 1794.8 |
| 1993-94 | 803 | 598.4 | 308.2 | 1709.6 | 133 | 1842.6 |
| 1994-95 | 818.1 | 657.7 | 298.8 | 1774.6 | 140.4 | 1915 |
| 1995-96 | 769.8 | 621 | 290.3 | 1681.1 | 123.1 | 1804.2 |
| 1996-97 | 817.3 | 693.5 | 341.1 | 1851.9 | 142.4 | 1994.3 |
| 1997-98 | 825.4 | 663.5 | 304 | 1792.9 | 138.3 | 1931.2 |
| 1998-99 | 860.8 | 712.9 | 313.3 | 1887 | 149.1 | 2036.1 |
| 1999-00 | 896.8 | 763.7 | 303.4 | 1963.9 | 134.1 | 2098 |
| Average | 740.4 | 577.9 | 305.0 | 1623.3 | 131.2 | 1754.4 |

**Source:** Hand book of Statistics on Indian Economy, publication of RBI.

Food grain production, including rice, increased significantly from 583.4 lakh metric tonnes in 1984–85 to 896.8 lakh metric tonnes in 1999–00, as shown in Table 2. During period I, rice production increased by 53.7 percent. Wheat production increased significantly from 440.7 lakh metric tonnes in 1984–85 to 763.7 lakh metric tonnes in 1999–00 with a growth rate of 73.29 percent; coarse cereal production increased significantly from 311.7 lakh metric tonnes in 1984–85 to 303.4 lakh metric tonnes in 1999–00 with a growth rate of -2.66 percent; and total cereal production increased significantly from 1335.8 lakh metric tonnes in 1984–85 to 1963. 8 lakh tonnes in 1999-00 with a growth rate of 47.01 percent; pulses production increased significantly from 119.6 lakh tonnes in 1984-85 to 134.1 lakh tonnes in 1999-00 with a growth rate of 12.68 percent; and total food grain production increased significantly from 1455.4 lakh tonnes in 1984-85 to 1504.4 lakh tonnes in 1999-00 with a growth rate of 3.37 percent.

**Table 3**
**Area of food grains items in India – 1984-85 to 1999-2000**

| *Year* | *Rice* | *Wheat* | *Coarse Cereals* | *Total Cereals* | *Pulses* | *Total Food grains* |
|---|---|---|---|---|---|---|
| 1984-85 | 412 | 236 | 392 | 1039 | 227 | 1267 |
| 1985-86 | 411 | 230 | 395 | 1036 | 244 | 1280 |
| 1986-87 | 412 | 231 | 397 | 1040 | 232 | 1272 |
| 1987-88 | 388 | 231 | 366 | 984 | 213 | 1197 |
| 1988-89 | 417 | 241 | 387 | 1045 | 232 | 1277 |
| 1989-90 | 422 | 235 | 377 | 1034 | 234 | 1268 |
| 1990-91 | 427 | 242 | 363 | 1032 | 247 | 1278 |
| 1991-92 | 427 | 233 | 334 | 993 | 225 | 1219 |
| 1992-93 | 418 | 246 | 344 | 1008 | 224 | 1232 |
| 1993-94 | 425 | 252 | 328 | 1005 | 223 | 1228 |
| 1994-95 | 428 | 257 | 322 | 1007 | 230 | 1237 |
| 1995-96 | 428 | 250 | 309 | 987 | 223 | 1210 |
| 1996-97 | 434 | 259 | 318 | 1011 | 225 | 1236 |
| 1997-98 | 435 | 267 | 308 | 1010 | 229 | 1239 |
| 1998-99 | 448 | 275 | 293 | 1017 | 235 | 1252 |
| 1999-00 | 452 | 275 | 293 | 1020 | 211 | 1231 |
| Average | 424.0 | 247.5 | 345.4 | 1016.8 | 228.4 | 1245.2 |

**Source:** Hand book of Statistics on Indian Economy, publication of RBI.

The area under cultivation of rice has remained relatively steady, rising from 412 lakh hectares in 1984–85 to 452 lakh hectares, with a growth rate of 9.7 percent in 1999–00. The area of wheat has changed from 263 lakh hectares in 1984–85 to 275 lakh hectares, with a growth rate of 16.5 percent in 1999–00. The area of coarse cereals has changed from 392 lakh hectares in 1984–85 to 293 lakh hectares, with a growth rate of -25.3 percent in 1999–00. The area of total cereals has changed from 1039 lakh hectares in 1984–85 to 1020 lakh hectares, with a growth rate of -1.8 percent in 1999–00. The area of pulses has changed from 227 lakh hectares in 1984–85 to 211 lakh hectares, with a growth rate of -7.4 percent in 1999–00. The area of total food grains has changed from 1267 lakh hectares in 1984–85 to 1231 lakh hectares, with a growth rate of -2.84 percent in 1999–00, respectively.

**Table 4**
**Yield of food grains items – 1984-85 to 1999-2000**

| *Year* | *Rice* | *Wheat* | *Coarse Cereals* | *Total Cereals* | *Pulses* | *Total Food grains* |
|---|---|---|---|---|---|---|
| 1984-85 | 1417 | 1870 | 795 | 1285 | 526 | 1149 |
| 1985-86 | 1552 | 2046 | 664 | 1323 | 547 | 1175 |
| 1986-87 | 1471 | 1916 | 675 | 1266 | 506 | 1128 |
| 1987-88 | 1465 | 2002 | 721 | 1315 | 515 | 1173 |
| 1988-89 | 1689 | 2244 | 814 | 1493 | 598 | 1331 |
| 1989-90 | 1745 | 2121 | 922 | 1530 | 549 | 1349 |
| 1990-91 | 1740 | 2281 | 900 | 1571 | 578 | 1380 |
| 1991-92 | 1751 | 2394 | 778 | 1574 | 533 | 1382 |
| 1992-93 | 1744 | 2327 | 1063 | 1654 | 573 | 1457 |
| 1993-94 | 1888 | 2380 | 939 | 1701 | 598 | 1501 |
| 1994-95 | 1911 | 2559 | 929 | 1763 | 610 | 1546 |
| 1995-96 | 1797 | 2483 | 940 | 1703 | 552 | 1491 |
| 1996-97 | 1882 | 2679 | 1072 | 1831 | 635 | 1614 |
| 1997-98 | 1900 | 2485 | 986 | 1775 | 567 | 1552 |
| 1998-99 | 1921 | 2590 | 1068 | 1856 | 634 | 1627 |
| 1999-00 | 1986 | 2778 | 1034 | 1925 | 635 | 1704 |
| Average | 1741.2 | 2322.2 | 893.8 | 1597.8 | 572.3 | 1409.9 |

**Source:** Hand book of Statistics on Indian Economy, publication of RBI.

Food grain rice yields increased from 1417 kg per hectare in 1984–85 to 1986 kg per hectare, up 40.2 percent in 1999–00. The wheat yields increased from 1870 kg per hectare in 1984–85 to 2778 kg per hectare, or 48.6 percent, in 1999–00. The coarse cereal yield increased from 795 kg per hectare in 1984–85 to 1034 kg per hectare with 30.1 percent in 1999–00. The total cereal yield increased from 1285 kg per hectare in 1984–85 to 1925 kg per hectare, or 49.8 percent, in 1999–00. The pulse yield increased from 526 kg per hectare in 1984–85 to 635 kg per hectare, or 20.7 percent, in 1999–00. The total area of food grain yield increased from 1149 kg per hectare in 1984–85 to 1704 kg per hectare with 48.3 percent in 1999–00, as shown in Table 4.

**Table 5**
**Growth of Production, Area and Yield of Food Grains in India – 2000-01 to 2015-16**

| *Year* | *Production* | *Simple Growth Rate* | *Area* | *Simple Growth Rate* | *Yield* | *Simple Growth Rate* |
|---|---|---|---|---|---|---|
| 2000-01 | 1968.1 | - | 1211 | - | 1626 | - |
| 2001-02 | 2128.5 | 8.150 | 1228 | 1.404 | 1734 | 6.642 |
| 2002-03 | 1747.8 | -17.886 | 1139 | -7.248 | 1535 | -11.476 |
| 2003-04 | 2131.9 | 21.976 | 1235 | 8.428 | 1727 | 12.508 |
| 2004-05 | 1983.6 | -6.956 | 1201 | -2.753 | 1652 | -4.343 |
| 2005-06 | 2086 | 5.162 | 1216 | 1.249 | 1715 | 3.814 |
| 2006-07 | 2172.8 | 4.161 | 1237 | 1.727 | 1756 | 2.391 |
| 2007-08 | 2307.8 | 6.213 | 1241 | 0.323 | 1860 | 5.923 |
| 2008-09 | 2344.7 | 1.599 | 1228 | -1.048 | 1909 | 2.634 |
| 2009-10 | 2181.1 | -6.977 | 1213 | -1.221 | 1798 | -5.815 |
| 2010-11 | 2444.9 | 12.095 | 1267 | 4.452 | 1930 | 7.341 |
| 2011-12 | 2592.9 | 6.053 | 1248 | -1.500 | 2078 | 7.668 |
| 2012-13 | 2571.3 | -0.833 | 1207 | -3.285 | 2129 | 2.454 |
| 2013-14 | 2650.4 | 3.076 | 1260 | 4.391 | 2101 | -1.315 |
| 2014-15 | 2520.2 | -4.912 | 1220 | -3.175 | 2070 | -1.475 |
| 2015-16 | 2515.7 | -0.179 | 1232 | 0.984 | 2056 | -0.676 |
| Average | 2271.7 | | 1223.9 | | 1854.8 | |

**Source:** Hand book of Statistics on Indian Economy, publication of RBI.

Food grain production increased significantly from 1968.1 lakh metric tonnes in 2000-01 to 2515.7 lakh metric tonnes in 2015-16, as shown in Table 5. During period I, the production of food grains increased by 27.8 percent. The area under cultivation of food grains has remained relatively steady, rising from 1211 lakh hectares in 2000–01 to 1232 lakh hectares in 2015–16. In period I, this is a 1.2 percent pickup. Food grain yields increased from 1626 kg per hectare in 2000–01 to 2056 kg per hectare in 2015–16. In period I, the yield per acre of food grains increased by 26.4 percent. The area, production, and yield of food grains all have a positive relationship. That is, the area under cultivation of food grains changed over time, resulting in changes in food grain production and yield per hectare.

**Table 6**
**Production of food grains items in India – 2000-01 to 2015-16**

| *Year* | *Rice* | *Wheat* | *Coarse Cereals* | *Total Cereals* | *Pulses* | *Total Food grains* |
|---|---|---|---|---|---|---|
| 2000-01 | 849.8 | 696.8 | 310.8 | 1857.4 | 110.7 | 1968.1 |
| 2001-02 | 933.4 | 727.7 | 333.7 | 1994.8 | 133.7 | 2128.5 |
| 2002-03 | 718.2 | 657.6 | 260.7 | 1636.5 | 111.3 | 1747.8 |
| 2003-04 | 885.3 | 721.6 | 376 | 1982.8 | 149.1 | 2131.9 |
| 2004-05 | 831.3 | 686.4 | 334.6 | 1852.3 | 131.3 | 1983.6 |
| 2005-06 | 917.9 | 693.5 | 340.7 | 1952.2 | 133.8 | 2086 |
| 2006-07 | 933.6 | 758.1 | 339.2 | 2030.8 | 142 | 2172.8 |
| 2007-08 | 966.9 | 785.7 | 407.5 | 2160.1 | 147.6 | 2307.8 |
| 2008-09 | 991.8 | 806.8 | 400.4 | 2199 | 145.7 | 2344.7 |
| 2009-10 | 890.9 | 808 | 335.5 | 2034.5 | 146.6 | 2181.1 |
| 2010-11 | 959.8 | 868.7 | 434 | 2262.5 | 182.4 | 2444.9 |
| 2011-12 | 1053 | 948.8 | 420.1 | 2422 | 170.9 | 2592.9 |
| 2012-13 | 1052.4 | 935.1 | 400.4 | 2387.9 | 183.4 | 2571.3 |
| 2013-14 | 1066.5 | 958.5 | 432.9 | 2457.9 | 192.5 | 2650.4 |
| 2014-15 | 1054.8 | 865.3 | 428.6 | 2348.7 | 171.5 | 2520.2 |
| 2015-16 | 1044.1 | 922.9 | 385.2 | 2352.2 | 163.5 | 2515.7 |
| Average | 946.9 | 802.6 | 371.3 | 2120.7 | 151.0 | 2271.7 |

**Source:** Hand book of Statistics on Indian Economy, publication of RBI.

Food grain production, including rice, increased significantly from 849.8 lakh metric tonnes in 2000–01 to 1044.1 lakh metric tonnes in 2015–16, as shown in Table 6. During period II, rice production increased by 22.8 percent. Wheat production increased significantly from 696.8 lakh metric tonnes in 2000-01 to 922.9 lakh metric tonnes in 2015-16, with a growth rate of 32.4 percent. Coarse cereal production increased significantly from 310.8 lakh metric tonnes in 2000-01 to 385.2 lakh metric tonnes in 2015-16, with a growth rate of 23.9 percent. The total cereal production increased significantly from 1857.4 lakh metric tonnes in 2000-01 to 2352.2 lakh metric tonnes in 2015-16, with a growth rate of 26.6 percent; pulse production increased significantly from 110.7 lakh metric tonnes in 2000-01 to 163.5 lakh metric tonnes in 2015-16, with a growth rate of 47.7 percent; and total food grain production increased significantly from 1968.1 lakh metric tonnes in 2000-01 to 2515.7 lakh metric tonnes in 2015-16, with a growth rate of 27.8 percent.

**Table 7**
**Area of food grains items in India – 2000-01 to 2015-16**

| *Year* | *Rice* | *Wheat* | *Coarse Cereals* | *Total Cereals* | *Pulses* | *Total Food grains* |
|---|---|---|---|---|---|---|
| 2000-01 | 447 | 257 | 303 | 1007 | 204 | 1211 |
| 2001-02 | 449 | 263 | 295 | 1008 | 220 | 1228 |
| 2002-03 | 412 | 252 | 270 | 934 | 205 | 1139 |
| 2003-04 | 426 | 266 | 308 | 1000 | 235 | 1235 |
| 2004-05 | 419 | 264 | 290 | 973 | 228 | 1201 |
| 2005-06 | 437 | 265 | 291 | 992 | 224 | 1216 |
| 2006-07 | 438 | 280 | 387 | 1005 | 232 | 1237 |
| 2007-08 | 439 | 280 | 285 | 1004 | 236 | 1241 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2008-09 | 455 | 278 | 275 | 1007 | 221 | 1228 |
| 2009-10 | 419 | 285 | 277 | 981 | 233 | 1213 |
| 2010-11 | 429 | 291 | 283 | 1003 | 264 | 1267 |
| 2011-12 | 440 | 299 | 264 | 1003 | 245 | 1248 |
| 2012-13 | 428 | 300 | 248 | 975 | 233 | 1207 |
| 2013-14 | 440 | 312 | 257 | 1008 | 252 | 1260 |
| 2014-15 | 439 | 310 | 242 | 990 | 231 | 1220 |
| 2015-16 | 435 | 304 | 244 | 983 | 249 | 1232 |
| Average | 434.5 | 281.6 | 282.4 | 992.1 | 232.0 | 1223.9 |

**Source:** Hand book of Statistics on Indian Economy, publication of RBI.

The area under cultivation of rice has remained relatively slow, from 447 lakh hectares in 2000–01 to 435 lakh hectares, with a growth rate of -2.7 percent in The area of wheat has changed from 257 lakh hectares in 2000–01 to 304 lakh hectares, with a growth rate of 18.3 percent in 2015–16. The area of coarse cereals has changed from 303 lakh hectares in 2000–01 to 244 lakh hectares, with a growth rate of -19.5 percent in 2015–16. The area of total cereals has changed from 1007 lakh hectares in 2000–01 to 983 lakh hectares, with a growth rate of -2.4 percent in 2015–16. The area of pulses has changed from 204 lakh hectares in 2000–01 to 249 lakh hectares, with a growth rate of 22.1 percent in 2015–16. The area of total food grains has changed from 1211 lakh hectares in 2000–01 to 1232 lakh hectares, with a growth rate of 1.7 percent in 2015–16, respectively.

**Table 8**
**Yield of food grains items in India – 2000-01 to 2015-16**

| *Year* | *Rice* | *Wheat* | *Coarse Cereals* | *Total Cereals* | *Pulses* | *Total Food grains* |
|---|---|---|---|---|---|---|
| 2000-01 | 1901 | 2708 | 1027 | 1844 | 544 | 1626 |
| 2001-02 | 2079 | 2762 | 1131 | 1980 | 607 | 1734 |
| 2002-03 | 1744 | 2610 | 966 | 1753 | 543 | 1535 |
| 2003-04 | 2077 | 2713 | 1221 | 1983 | 635 | 1727 |
| 2004-05 | 1984 | 2602 | 1153 | 1903 | 577 | 1652 |
| 2005-06 | 2102 | 2619 | 1172 | 1968 | 598 | 1715 |
| 2006-07 | 2131 | 2708 | 1182 | 2021 | 612 | 1756 |
| 2007-08 | 2202 | 2802 | 1431 | 2151 | 625 | 1860 |
| 2008-09 | 2178 | 2907 | 1459 | 2183 | 659 | 1909 |
| 2009-10 | 2125 | 2839 | 1212 | 2075 | 630 | 1798 |
| 2010-11 | 2239 | 2988 | 1531 | 2256 | 691 | 1930 |
| 2011-12 | 2393 | 3177 | 1590 | 2415 | 699 | 2078 |
| 2012-13 | 2461 | 3117 | 1617 | 2449 | 789 | 2129 |
| 2013-14 | 2424 | 3075 | 1677 | 2438 | 764 | 2101 |
| 2014-15 | 2390 | 2872 | 1729 | 2373 | 744 | 2070 |
| 2015-16 | 2400 | 3034 | 1579 | 2392 | 656 | 2056 |
| Average | 2176.9 | 2845.8 | 1354.8 | 2136.5 | 648.3 | 1854.8 |

**Source:** Hand book of Statistics on Indian Economy, publication of RBI.

Food grain rice yields increased from 1901 kg per hectare in 2000–01 to 2400 kg per hectare, or 26.2 percent, in 2015–16. The wheat yields increased from 2708 kg per hectare in 2000–01 to 3034 kg per hectare, up 12.1 percent in 2015–16. The coarse cereal yield increased from 1027 kg per hectare in 2000–01 to 1579 kg per hectare in 2000–01, or 53.7 percent. The total cereal yield increased from 1844 kg per hectare in 2000–01 to 2392 kg per hectare in 2015–16, or 29.7 percent. The pulse yield increased from 544 kg per hectare in 2000–01 to 656 kg per hectare in 2015–16 by 20.7 percent. The total area of food grain yield increased from 1626 kg per hectare in 2000–01 to 2056 kg per hectare in 2015–16 by 48.3 percent.

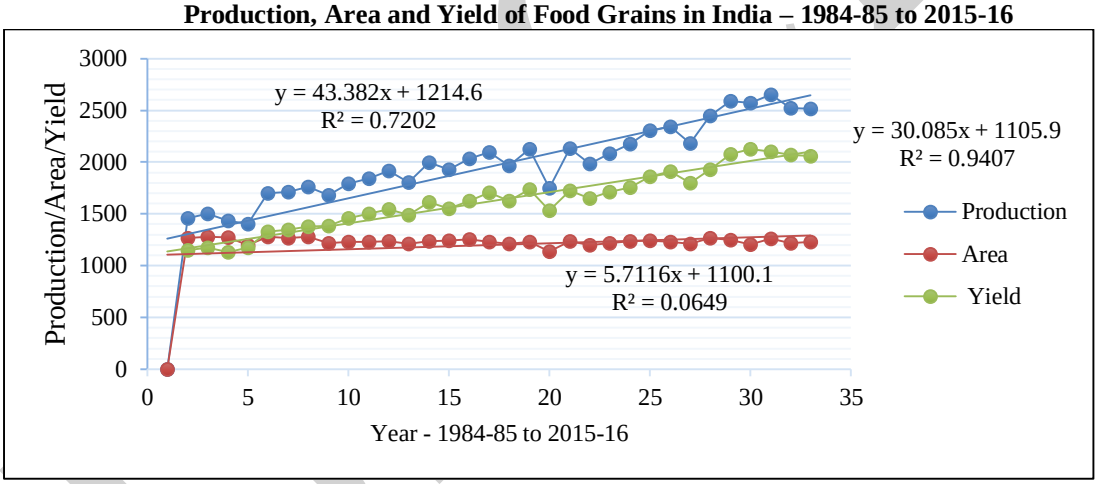
**Table 9**
**CAGR of Food Grains Production, Area and Yield in India – Pooled Period**

| *CAGR of Food Grains Production (Million Tonnes)* | | | | | | |
|---|---|---|---|---|---|---|
| | *Cereals* | | | *Total Cereals* | *Pulses* | *Total Food Grains* |
| | *Rice* | *Wheat* | *Coarse Cereals* | | | |
| CAGR (Period I) | 0.027 | 0.035 | -0.002 | 0.024 | 0.007 | 0.023 |
| CAGR (Period II) | 0.013 | 0.018 | 0.014 | 0.015 | 0.025 | 0.015 |
| CAGR of Area Under Cultivation of Food Grains (Lakh Hectares) | | | | | | |
| CAGR (Period I) | 0.010 | -0.018 | -0.001 | -0.005 | -0.002 | 0.010 |
| CAGR (Period II) | -0.002 | 0.011 | -0.013 | -0.002 | 0.013 | 0.001 |
| CAGR of Yield Per Hectare of Food Grains (Kg per Hectare) | | | | | | |
| CAGR (Period I) | 0.025 | 0.017 | 0.026 | 0.012 | 0.025 | 0.025 |
| CAGR (Period II) | 0.015 | 0.007 | 0.027 | 0.016 | 0.012 | 0.015 |

**Source:** Authors calculation.

Table 9 illustrates the CAGR of food grain output and area under food grain cultivation from period I to period II, indicating that coarse cereals and pulses outperformed rice and wheat, while overall cereals and total food grain rates have declined. The CAGR of the area under cultivation of rice, coarse cereals, and total cereals has been negative over the two periods, but positive and somewhat improving in wheat, pulses, and total food grains.

**Figure 1**
**Production, Area and Yield of Food Grains in India – 1984-85 to 2015-16**




**Source:** Authors calculation.

Figure 1. Trend line of total production, area, and yield in the period 1985–86 to 2015–16. In this figure, the trend of food grain output, area, and yield per hectare from 1985 to 2016 is shown with coefficients of 43.382, 5.7116, and 30.085 and intercepts of 1214.6, 1100.1, and 1105.9, respectively.

## 6. CONCLUSION

Although the Indian economy is still in its early stages, agriculture remains the primary source of income for the vast majority of the population. The agricultural sector ensures food security and nutrition for India's massive population, as well as supplies a large quantity of raw materials to various industries, has an increased industrial base in the country, and creates a production surplus for export. Food grain production increased significantly from 1455.4 lakh metric tonnes in 1984–85 to 2098 lakh metric tonnes in 1999–00. The production of food grains increased by 44.15 percent. The area under cultivation of food grains has remained relatively steady, slowing from 1267 lakh hectares in 1984–85 to 1231 lakh hectares in 1999–00. This is a -2.84 percent drop. Food grain yields increased from 1149 kg per hectare in 1984–85 to 1704 kg per hectare in 1999–00. In period I, the yield per acre of food grains increased by 48.3 percent. Food grain yields increased from 1626 kg per hectare in 2000–01 to 2056 kg per hectare in 2015–16. In period II, the yield per acre of food grains increased by 26.4 percent. The area, production, and yield of food grains all have a positive relationship. That is, the area under cultivation of food grains changed over time, resulting in changes in food grain production and yield per hectare. As a result, the

focus should be on expanding the area by utilising adequate land and increasing yield through technical innovation, agricultural research, and training, as well as boosting policy implementation in India.

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