

GROPING THE SHRIVING OF CULTIVABLE LAND IN INDIA

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Abstract *Agriculture in India is a combination of traditional and modern farming techniques. Although main occupation of Indian is agriculture, in spite of this, agriculture growth rate is very low; that's why the present study is mainly concerned with analysing the temporal growth of agriculture production of food grains with the help of various statistical techniques. The study has considered period from 2000-01 to 2014-15. The present study is based upon secondary data. In the last many years, there is an upward and downward fluctuation in all the food grains crops under area under cultivation. Cultivable land in India continues to shrivel. The decline is mainly ascribed to distraction of cultivable land for non-agricultural purposes, including construction, industries, and other development activities. Prime Minister Shri Narendra Modi has expressed his concerns over shrinking of land resources because of the fragmentation of land. He further said that the Kisan Channel should act as an open university for farmers in terms of guidance and proper knowledge for better agricultural techniques. It is suggested that technological and institutional support for all the crops should be there. Along with diversification of agricultural activities, an imperative factor for enhancing agricultural production and productivity in India is to be considered. Further, better irrigation facilities, normal rainfall, and improved fertilizer consumption will help a lot to enlarge the total food-grains in the country.*

Keywords *Agriculture and Non-Agricultural Purposes, Growth Rate, Food Grains, Productivity*

INTRODUCTION

Agriculture in India is a combination of traditional and modern farming techniques. Although the main occupation of Indian is agriculture, in spite of this agriculture growth rate is very low. As the report of World Bank, India Country Overview 2008 observed that slow agricultural growth is a concern for policy makers as about two-third of India's population depends on rural employment for a living. Current agricultural practices are neither economically nor environmentally sustainable and India's yields for many agricultural commodities are low. Poorly maintained irrigation systems and almost universal lack of good extension services are among the factors responsible. Farmers' access to markets is hampered by poor roads, rudimentary market infrastructure, and excessive regulation.

In last many years, there has been an upward and downward fluctuation in all the food grains crops under area under cultivation. Now the question arises why there was the downward fluctuation of area under fluctuations. An important news, "Cultivable land continues to shrink" by Vishwa Mohan on TNN on Aug 16, 2013, 04.19 AM IST opined that cultivable land in India continues to shrink. It may not pose an immediate problem for the nation's food security but its long-term effect could be disastrous with the country needing more and more food grains to support its growing population. According to him the decrease is mainly attributed to diversion of cultivable land for non-agricultural purposes, including construction, industries, and other development activities. The author agrees with Vishwa Mohan.

Objectives of the Paper

This paper is mainly concerned with analysing the temporal growth of agriculture production of food grains with the help of various statistical techniques.

Plan of the Paper

This paper consists of five sections. First section is all about introduction of agriculture and its importance. It also covers the objectives and plan of the study.

Second section deals with review of literature concerning with the objectives of the study.

Third section studies database and methodology used in the paper.

Fourth section analyses the temporal growth of agriculture production of food.

Fifth section ends up with policy implication and conclusion.

REVIEW OF LITERATURE

Thenmozhi and Thilagavathi (2014) suggested in their paper we must adopt all possible methods to improve our agriculture and raise its productivity. The natural factors militating against raising of agricultural productivity must be overcome. Ample irrigation facilities must be provided through the extension of major and minor irrigation works.

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Liberal supplies of insecticides should be distributed among the farmers free or at very cheap rates. Increase in agricultural production and productivity leads to increase in the income of the farmers. This increased income of the rural community will lead to more savings which can be used for either further development of non-agricultural occupations, as well as industry

Ghosh (2011) says that since early-1990s, Indian agriculture has also faced competition from the global economy in the wake of globalisation. This has led to the emergence of a decelerating tendency in Indian agriculture especially in terms of growth of production of major crops and total agricultural production. In view of the above, diversification of agricultural activities is considered important for enhancing agricultural production and productivity in India. This study examines cropping pattern changes in Indian agriculture during the period 1970-71 to 2006-07. In terms of Herfindal index and substitution and expansion effects, the concentration and/or diversification reveals that the cropping pattern in India in terms of allocation of acreage is skewed towards food grains. However, few non-food grain cash crops such as cotton, sugarcane, oilseeds, and vegetables have emerged as popular crops among the farmers in recent year.

Amutha (2012) concluded in his study that a large part of the Indian agriculture depends on monsoon so that the market of agriculture and essential commodities show fluctuation due to early/delayed arrived of monsoon. The economics of environmental pollution, depletion and degradation of resources have in fact been neglected as compared to the issues of growth and expansion. India has been no exceptions to this worldwide phenomenon. The trends of environmental deterioration in India, because of the substantial increase in its population, have been far more prominent as compared to other developing economies.

Ahmad and Haseen (2012) in their study analysed that 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. The growth rate in the food grains production and productivity has decelerated when India entered in the era of globalisation.

Kannan and Sundaram's (2007-08) analysis of data reveals that the cropping pattern in India has undergone significant changes over time. There is a marked shift from the

cultivation of food grains to commercial crops. Among food grains, area under coarse cereals declined by 13.3 percent between 1970-71 and 2007-08. Similarly, the performance of pulses in terms of area and output was not impressive during the study period. The use of technological inventions in the cultivation of other crops was also not so conspicuous in pulses. Nevertheless, 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 fertilizers were important factors that ensured higher growth in crop production. However, technological and institutional support for a few crops like rice and wheat brought significant changes in crop area and output composition in some regions. The results of crop output growth model indicate that the enhanced capital formation, better irrigation facilities, normal rainfall and improved fertilizer consumption helped to improve crop output in the country.

Kumar, Sharma, and Ambammal (2014) observed that climate change is likely to affect the agricultural production adversely and become more serious concern for developing countries because they do not have enough resources to mitigate the adverse effect of climate change. Statistics show that the amount of undernourished people is still alarmingly in developing world, so as the case of India. Agriculture sector is most sensitive to climate change and it affects the food security of India. This study estimates the impact of climatic and non-climatic factors on food grain productivity to facilitate the development of appropriate farm policies to cope with climate change. Productivity of rice, maize, sorghum, and rag crops is negatively influenced with increase in actual average maximum temperature. Actual average minimum temperature has negative and statistically significant effects on wheat, barley, gram, and rice crops. Productivity of barley, rice, maize, and ragi crops tend to decline due to excessive rain and changing in rainfall pattern.

DATA BASE AND METHODOLOGY

The study has considered a period from 2000-01 to 2014-15. The data for the sample years cover data on financial year basis, i.e., beginning from 1st April of existing year to 31st March of succeeding year. The present study is based upon secondary data. The data have been culled out from various issues of Handbook of Statistics on Indian Economy, Ministry of Agriculture & Farmers Welfare, Government of India and Ministry of Agriculture & Farmers Welfare, Government of India. Various statistical techniques such as geometric mean, standard deviation, median, average, compound growth rate, and annual growth rate have been used from 2000-01 To 2014-15. Further tabulation technique and trend lines have been drawn for the better understanding of the complex data.

TEMPORAL ANALYSIS OF AREA UNDER CULTIVATION OF FOOD GRAINS

Area under cultivation consists of net area sown and current fallows. This section presents the empirical findings of the area under cultivation along with their growth rates for the period 2000-01 to 2014-15 through tables and figures. The empirical findings show that area under cultivation of food grains has registered growth at the rate of -0.001, 0.013, -0.016, -0.001, and 0.009 percent per annum respectively for rice, wheat, cereals, and pulses during 2000-01 to 2014-15. During this period, wheat realised the growth rate of 0.013 percent while pulses realized the growth rate of 0.009 percent. Thus, it is obvious from the analysis that wheat and pulses have contributed more than rice and cereals. As indicated in Table 1, the growth rates of area under cultivation of food grains have experienced variations during study years.

The positive growth rates of rice have been observed during the years 2003, 2005 to 2009, 2011, 2012, and 2014 ranging from 0.23 (2007-08) to 4.18 (2005-06) percent. However, the productivity losses have been noticed in the remaining five study years. The negative growth rates have been observed during the periods 2002, 2004, 2010, 2013, and 2015 ranging from -0.2 percent to -8.29 percent during 2014-

15 and 2002-03, respectively. Similarly, The positive growth rates of wheat have been observed during the years 2002, 2004, 2006, 2006, 2007, 2008, 2010 to 2014 ranging from 0.18 (2007-08) to 5.70 (2006-07) percent. However, the productivity losses have been noticed in the remaining four study years. The negative growth rates have been observed during the periods 2003, 2005, 2009, and 2015 ranging from -0.71 percent to -4.33 percent during 2014-15 and 2002-03 respectively.

Further, The positive growth rates of cereals have been observed during the years 2004, 2010, 2011, 2006, 2014 ranging from 0.10 (2005-06) to 14.12 (2003-04) percent. However, the productivity losses have been noticed in the remaining nine study years. The negative growth rates have been observed during the periods 2002, 2003, 2005, 2007, 2007, 2008, 2009, 2012, 2013 and 2015 ranging from -0.80 percent to -8.57 percent during 2007-08 and 2002-03 respectively. Coming towards pulses growth rates, The positive growth rates of cereals have been observed during the years 2002, 2004, 2007, 2008, 2010, 2011, and 2014 ranging from 0.3.57 (2006-07) to 14.44 (2003-04) percent. However, the growth losses have been noticed in the remaining seven study years. The negative growth rates have been observed during the periods 2003, 2005, 2006, 2009, 2012, 2013, and 2015 ranging from -1.63 percent to -8.44 percent during 2005-06 and 2014-15 respectively.

Table 1 : Annual Growth Rates of Area Under Cultivation - Food Grains (2000-01 to 2014-15)

Year	Rice (Mh)	Growth rate	Wheat (Mh)	Growth rate	Coarse Cereals (Mh)	Growth rate	Total (2+3+4)	Growth rate	Pulses (Mh)	Growth rate
2000-01	44.71	-----	25.73	-----	30.26	-----	100.70	-----	20.35	-----
2001-02	44.90	0.42	26.34	2.37	29.52	-2.45	100.76	0.06	22.01	8.16
2002-03	41.18	-8.29	25.20	-4.33	26.99	-8.57	93.37	-7.33	20.50	-6.86
2003-04	42.59	3.42	26.60	5.56	30.80	14.12	99.99	7.09	23.46	14.44
2004-05	41.91	-1.60	26.38	-0.83	29.03	-5.75	97.32	-2.67	22.76	-2.98
2005-06	43.66	4.18	26.48	0.38	29.06	0.10	99.20	1.93	22.39	-1.63
2006-07	43.81	0.34	27.99	5.70	28.71	-1.20	100.51	1.32	23.19	3.57
2007-08	43.91	0.23	28.04	0.18	28.48	-0.80	100.43	-0.08	23.63	1.90
2008-09	45.54	3.71	27.75	-1.03	27.45	-3.62	100.74	0.31	22.09	-6.52
2009-10	41.92	-7.95	28.46	2.56	27.68	0.84	98.06	-2.66	23.28	5.39
2010-11	42.86	2.24	29.07	2.14	28.34	2.38	100.27	2.25	26.40	13.40
2011-12	44.01	2.68	29.86	2.72	26.42	-6.77	100.29	0.02	24.46	-7.35
2012-13	42.75	-2.86	30.00	0.47	24.76	-6.28	97.51	-2.77	23.26	-4.91
2013-14	43.95	2.81	31.19	3.97	25.67	3.68	100.81	3.38	25.23	8.47
2014-15	43.86	-0.20	30.97	-0.71	24.15	-5.92	98.98	-1.82	23.10	-8.44

Note: Data for 2014-15 are based on Fourth Advance Estimates. Mh denotes Million hectares.

Source: Ministry of Agriculture & Farmers Welfare, Government of India.

Source: Handbook of Statistics on Indian Economy

Note: Growth Rate is calculated by author.

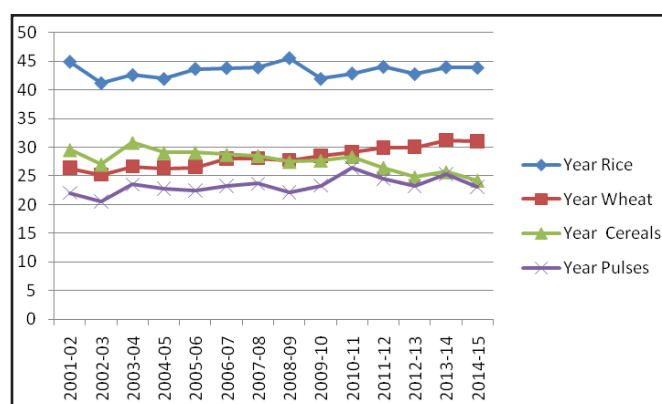


Fig. 1: Area Under Cultivation – Food grains

ANNUAL GROWTH RATE OF AREA UNDER AGRICULTURE OF TOTAL FOOD GRAINS

Table 2 and Fig. 2 reported positive growth rate in terms of area under cultivation of all food grains in the years 2002, 2004, 2006, 2007, 2008, 2011, and 2014 ranging from 0.29 percent (2007-08) to 8.41 percent (2003-04). However, the growth losses have been noticed in the remaining seven study years. The negative growth rates have been observed during the periods 2003, 2005, 2009, 2010, 2012, 2013, and 2015 ranging from -1.52 percent to -7.25 percent during 2011-12 and 2002-01 respectively.

Table 2 : Annual Growth Rates of Area Under Cultivation – Total Food Grains (2000-01 to 2014-15)

Year	Total Food grains (Mh)	Growth rate
2000-01	121.05	-----
2001-02	122.77	1.42
2002-03	113.87	-7.25
2003-04	123.45	8.41
2004-05	120.08	-2.73
2005-06	121.6	1.27
2006-07	123.7	1.73
2007-08	124.06	0.29
2008-09	122.83	-0.99
2009-10	121.33	-1.22
2010-11	126.67	4.40
2011-12	124.75	-1.52
2012-13	120.7	-3.25
2013-14	126.04	4.42
2014-15	122	-3.21

Note: Data for 2014-15 are based on Fourth Advance Estimates. Mh denotes Million hectares.

Source: Ministry of Agriculture & Farmers Welfare, Government of India.

Source: Handbook of Statistics on Indian Economy.

Note: Growth Rate is calculated by author.

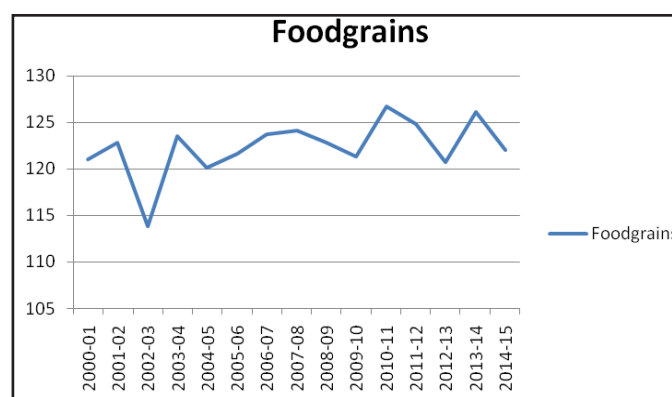


Fig. 2: Annual Growth Rate of Area Under Agriculture of Total Food Grains

STUDYING THE PERFORMANCE OF TOTAL FOOD GRAINS UNDER AREA UNDER CULTIVATION WITH DIFFERENT STATISTICAL TECHNIQUES

Further various statistical techniques have been used by the author for studying the performance of total food grains under area under cultivation. As clear from Table 3, rice has geometric mean 43.42, SD of 1.21, along with median and average as 43.81 and 42.44 respectively. Similarly in case of wheat, it has geometric mean 27.94, SD of 1.90, along with median and average as 27.99 and 28.00 respectively. As far as cereals are concerned, it has geometric mean 27.76, SD of 1.94, along with median and averages as 28.34 and 27.82 respectively. Pulses have geometric mean 23.02, SD of 1.58, along with median and average as 23.19 and 23.07 respectively. Further total food grains has geometric mean 122.29, SD of 1.94, along with median and average as 28.34 and 27.82 respectively.

Table 3: The Performance of Total Food Grains under Area under Cultivation with Different Statistical Techniques

Statistical Technique	Rice (2)	Wheat (3)	Coarse Cereals (4)	Pulses (5)	Total Food grains (2+3+4+5)
Geometric Mean	43.42	27.94	27.76	23.02	122.29
SD	1.21	1.90	1.94	1.58	3.02
Median	43.81	27.99	28.34	23.19	122.77
Average	43.44	28.00	27.82	23.07	122.33
Compound Growth Rate (2000-01 To 2014-15)	-0.001	0.013	-0.016	0.009	0.001

Source: Author's Calculations

CONCLUSIONS AND POLICY IMPLICATIONS

Agriculture in India is a combination of traditional and modern farming techniques. Although the main occupation of Indian is agriculture, in spite of this, agriculture growth rate is very low. That's why the present study is mainly concerned with analysing the temporal growth of agriculture production of food grains with the help of various statistical techniques. The study has considered period from 2000-01 to 2014-15. The data for the sample years cover data on financial year basis, i.e., beginning from 1st April of existing year to 31st March of succeeding year. The present study is based upon secondary data. In last many years, there has been an upward and downward fluctuation in all the food grains crops under area under cultivation. Now the question arises why there was the downward fluctuation of area under fluctuations. An important news, "Cultivable land continues to shrink" by Vishwa Mohan on TNN on Aug 16, 2013, 04.19 AM IST opined that cultivable land in India continues to shrink. It may not pose an immediate problem for the nation's food security but its long-term effect could be disastrous with the country needing more and more food grains to support its growing population. According to him the decrease is mainly attributed to diversion of cultivable land for non-agricultural purposes, including construction, industries and other development activities. The author agrees with Vishwa Mohan.

Prime Minister Shri Narendra Modi expressed his concern over a growing population and the shrinking land resources because of the fragmentation of land. He said, "Fifty years ago, a family used to have 50 big has (about 20 acres) of land and now it has reduced to only two-three big has because of the division of land (following family structure)". He also expressed concern that if agricultural production was not increased in the country, there would be a shortage of grains and it would affect the economy of farmers. In the end it is suggested that technological and institutional support for all the crops should be there. Along with diversification of agricultural activities, an imperative factor for enhancing agricultural production and productivity in India is to be considered. Further, better irrigation facilities, normal rainfall, and improved fertilizer consumption will help a lot to enlarge the total food grains in the country. As Prime Minister said that there is growing awareness among farmers

about how to increase productivity as they are adopting vermicompost for this purpose. "It will save the fertility of the land and reduce consumption of urea. Excessive use of urea is spoiling the fertility of soil," he added. He further said that the Kisan Channel should act as an open university for farmers in terms of guidance and proper knowledge for better agricultural techniques. (Need second Green Revolution without any delay, should start from Eastern India: PM Modi, Last Updated: Monday, June 29, 2015 - 00:35, Zee News.)

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