

Paddy and Wheat Production in Punjab: An Overview of Study on Growth and Instability

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Abstract

India's total foodgrains production involves 25 percent contribution of paddy and wheat in 2000. After china, India is the second largest manufacturer of paddy and wheat. Both the crops provide food security to the residence of nation along with transformed the country from food deficient to food sufficient country. In this paper, an attempt has been made to analyze the growth and instability in the geographical areas and production of paddy and wheat in Punjab along with evaluate the factors affecting the growth. Furthermore, this study will be based on secondary data for the period of 10 years from 2010-2020. The data will be collected from various secondary sources like statistical abstract of Punjab, economic survey, research papers, reports, newspapers etc. The study revealed that positive compound annual growth were found in both the crops and highest variation was found in production as compared to area and yield. It was observed negative annual growth in both the crops in some years.

Keywords:[CAGR, Instability, Income, Fertile and Foodgrains]

Introduction

In India Punjab hold largest portion of fertile land and performed very well in foodgrain production along with industrial sector. Most of the population of Punjab lived in rural area and engaged in agriculture sector directly or indirectly. In agriculture development Punjab hold outstanding position among Indian states and there was great increase in agriculture production during green revolution time. In India foodgrains production includes major portion of paddy and wheat, and Punjab is the major supplier to India's central pool of foodgrains production. Currently, during rabi season 80 percent area of Punjab is used for wheat cultivation and 60 percent area of state is used for rice cultivation during kharif season. These two crops contributed nearly about 85 percent towards state agriculture production. At present the global population is increasing rapidly so the global consumption of paddy and wheat also increasing rapidly. There is need to increase foodgrains production with availability of improved technology to feed global population. India is the second largest producer of rice and wheat after China, as the country produces 101.29 million tonnes of wheat and 175.58 million tonnes of rice annually (FAOSTAT, 2018). In 2020, Punjab has produced over 17 million metric tons of wheat and 12 million metric tons of paddy. Paddy and wheat both are majorly growing crops and plays important role in increasing the income of the farmers in Punjab. On the other hand, if we talk about the relationship between growth and instability, the modern technology plays important role in increasing or decreasing variation in some crops. The modern technologies do help to reduce variability in yields and production only a few crops (MehraShakuntala 1981). There are many studies on instability conducted during 1980s concluded that agriculture production had become more unstable af-

ter the introduction of new agricultural technology (Mehra 1981; Hazell 1982; Dev 1987; and Ray et al 1988). So it is important to analyse the growth and instability in paddy and wheat crops that will able to realize the nature of food security and income stability. To keep in view the importance of both the crops, the present paper is an attempt to analyze the growth and instability in the geographical areas and production of paddy and wheat in Punjab along with evaluate the factors affecting the growth.

Research Design

The present study is based on secondary data has been collected from various published sources such as online publications, magazine, Books, Journals, Statistical Abstract of Punjab etc. The data were taken for the period of ten years from 2010-11 to 2019-20. The result has been analyzed by using the annual growth rate and Compound Annual Growth Rate (CAGR) of area cultivated, production, yield per hectare of Paddy and Wheat. Instability is the deviation from the tendency and analyzed with the help of coefficient of variation by using the following formula:-

$$CV = (SD / MEAN) \times 100$$

The standard deviation as a percentage of means is called as the coefficient of variation.

Data Analysis and Interpretation

The growth of wheat area cultivated, production and yield per hectare are represented in table 1. The total area under wheat cultivation in Punjab increased from 3510 thousand hectare in 2010-11 to 3521 thousand hectare in 2019-20 with minor compound annual growth rate 0.03 percent. There has been little bid increase in area under wheat cultivation in Punjab. The annual growth rate of area cultivated under wheat was decreased from 0.51 percent to 0.03 percent.

Table 1: Compound Annual Growth Rates and Growth Rates of Area, Production and Yield per Hectare of Wheat

Year	Cultivated Area (000 hectare)	%age of Annual Growth	Production (000 metric ton)	%age of Annual Growth	Yield (kg per hectare)	%age of Annual Growth
2010-11	3510	-	16472	-	4693	-
2011-12	3528	0.51%	17982	8.40%	5097	7.93%
2012-13	3512	-0.46%	16591	-8.38%	4724	-7.90%
2013-14	3510	-0.06%	17610	5.79%	5017	5.84%
2014-15	3505	-0.14%	15086	-16.73%	4304	-16.57%
2015-16	3506	0.03%	16068	6.11%	4583	6.09%
2016-17	3495	-0.31%	17636	8.89%	5046	9.18%
2017-18	3512	0.48%	17830	1.09%	5077	0.61%
2018-19	3520	0.23%	18262	2.37%	5188	2.14%
2019-20	3521	0.03%	17616	-3.67%	5004	-3.68%
C.A.G.R	0.03%		0.75%		0.72%	

Source:-Statistical Abstract of Punjab 2010 to 2020

The table showed that total production of wheat were increased from 16472 thousand metric ton in 2010-11 to 17616 thousand metric ton in 2019-20 with minor compound annual growth rate 0.75 percent. The study further revealed that the highest negative annual growth rate of wheat production was recorded (-16.73 %) in 2014-15, followed by (-8.38%) in 2012-13 and by (-3.67 %) in 2019-20. The highest annual growth rate of wheat production was found 8.89 percent in 2016-17 and 8.40 percent in 2011-12.

The study further revealed that total Yield of wheat were increased from 4693 kg per hectare in 2010-11 to 5004 kg per hectare in 2019-20 with compound annual growth rate 0.72 percent. The study further revealed that the highest negative annual growth rate of wheat yield was recorded (-16.57 %) in 2014-15, followed by (-7.90%) in 2012-13 and by (-3.68 %) in 2019-20. The highest annual growth rate of wheat yield was found 9.18 percent in 2016-17 and 7.93 percent in 2011-12.

The table 2 shows the growth of Paddy area cultivated, production and yield per hectare. The total area under paddy cultivation in Punjab increased from 2830 thousand hectare in 2010-11 to 3142 thousand hectare in 2019-20 with compound annual growth rate 1.17 percent. There has been not much increase in area under paddy cultivation in Punjab. The annual growth rate of area cultivated under paddy was increased from -0.43 percent to 1.24 percent.

Table 2: Compound Annual Growth Rates AND Growth Rates of Area, Production and Yield of Paddy

Year	Cultivated Area (000 hectare)	%age of Annual Growth	Production (000 m ton)	%age of Annual Growth	Yield (kg per hectare)	%age of Annual Growth
2010-11	2830	-	10833	-	3828	-
2011-12	2818	-0.43%	10542	-2.76%	3741	-2.33%
2012-13	2845	0.95%	11374	7.31%	3998	6.43%
2013-14	2849	0.14%	11259	-1.02%	3952	-1.16%
2014-15	2895	1.59%	11111	-1.33%	3838	-2.97%
2015-16	2970	2.53%	11803	5.86%	3974	3.42%
2016-17	3046	2.50%	12638	6.61%	4149	4.22%
2017-18	3065	0.62%	13382	5.56%	4366	4.97%
2018-19	3103	1.22%	12822	-4.37%	4132	-5.66%
2019-20	3142	1.24%	12675	-1.16%	4034	-2.43%
C.A.G.R	1.17%		1.76%		0.58%	

Source:-Statistical Abstract of Punjab 2010 to 2020

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The table showed that total production of paddy were increased from 10833 thousand metric ton in 2010-11 to 12675 thousand metric ton in 2019-20 with compound annual growth rate 1.76 percent. The study further revealed that the highest annual growth rate of paddy production was recorded (7.31 %) in 2012-13, followed by (6.61%) in 2016-17 and by (5.86 %) in 2015-16. The highest negative annual growth rate of paddy production was found -4.37 percent in 2018-19 and -2.76 percent in 2011-12.

The study further revealed that total Yield of paddy were increased from 3828 kg per hectare in 2010-11 to 4034 kg per hectare in 2019-20 with compound annual growth rate 0.58 percent. The study further revealed that the highest negative annual growth rate of paddy yield was recorded (-5.66 %) in 2018-19, followed by (-2.97%) in 2014-15 and by (-2.43 %) in 2019-20. The highest annual growth rate of paddy yield was found 6.43 percent in 2012-13 and 4.97 percent in 2017-18. Table 3 below presented the instability in area, production and yield of wheat during the study period. In the whole period of study highest variation 5.92 percent was found in production of wheat with mean value 17115.3 and Standard deviation value 1013.63 as compare to area and yield. The variation in area and yield of wheat were 0.26 percent and 5.80 percent along with mean value 3511.9 and 4873.3 respectively. The value of standard deviation was 9.32 and 283.09 in area and yield of wheat.

Table 3: Instability in Area, Production and Yield of Wheat in Punjab			
Year	Cultivated Area (000 hectare)	Production (000 metric ton)	Yield (kg per hectare)
2010-11	3510	16472	4693
2011-12	3528	17982	5097
2012-13	3512	16591	4724
2013-14	3510	17610	5017
2014-15	3505	15086	4304
2015-16	3506	16068	4583
2016-17	3495	17636	5046
2017-18	3512	17830	5077
2018-19	3520	18262	5188
2019-20	3521	17616	5004
Mean	3511.9	17115.3	4873.3
S.D	9.326783	1013.633	283.0987
C.V	0.265577	5.922379	5.80918
Source:-Statistical Abstract of Punjab 2010 to 2020 and Instability is measured in percent			

Table 4: Instability in Area, Production and Yield of Paddy in Punjab			
Year	cultivated Area (000 hectare)	Production (000 m ton)	Yield (kg per hectare)
2010-11	2830	10833	3828
2011-12	2818	10542	3741
2012-13	2845	11374	3998
2013-14	2849	11259	3952
2014-15	2895	11111	3838
2015-16	2970	11803	3974
2016-17	3046	12638	4149
2017-18	3065	13382	4366
2018-19	3103	12822	4132
2019-20	3142	12675	4034
Mean	2956.3	11843.9	4001.2
S.D	124.1827	969.6703	182.7614
C.V	4.200612	8.187086	4.567665
Source:-Statistical Abstract of Punjab 2010 to 2020 and Instability is measured in percent			

The above table 4 presented the instability in area, production and yield of paddy during the study period. In the whole period of study highest variation 8.18 percent was found in production of paddy with mean value 11843.9 and Standard deviation value 969.67 as compare to area and yield. The variation in area and yield of paddy were 4.20 percent and 4.56 percent along with mean value 2956.3 and 4001.2 respectively. The value of standard deviation was 124.18 and 182.76 in area and yield of Paddy.

Conclusion

From the analysis of growth in paddy and wheat, it was found that area, production and yield observed an increasing trend, they increased at a growth rate of 1.17 percent, 1.76 percent and 0.58 percent in paddy. But in the wheat growth in area was stagnant and the production and yield was increased at a growth rate of 0.75 percent and 0.72 percent respectively. The instability analysis showed that more variation in growth was found in production of both the crops followed by yield and area respectively. The stability of area was found under wheat crop which implies that cropping pattern of wheat were stable during the study period. So in the end to increase the production and yield of both the crops with limited agriculture land will be possible various government schemes, improved production technology and R& D innovations.

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