

Growth Efficiency in Production of Major Crops in Haryana: A District Level Study

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Research

Received date: 22/10/2021

Accepted date: 28/10/2021

Published date: 05/11/2021

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Keywords: *Centella asiatica (L)*, *Phytochemical*, *Antimicrobial*, *GC-MS*, *Steroid*

ABSTRACT

The agriculture production in Haryana is divided into two seasonal crops Kharif and Rabi. The major crops of the Kharif season include Rice, Sugarcane, Maize, Ground Nut, Bajra, Jawar, Pulses, Cotton, and Vegetables and the Rabi crops include Wheat, Gram, Tobacco, and Mustard. Since agriculture plays a vital role in the Economy of Haryana state, therefore, the Government of Haryana launches various schemes such as crop insurance, insurance depending on weather, organic farming, RKVY, etc. for agriculture growth production. Further, it is observed that the reforms started by the Government directly push up the agriculture production. This paper studies the compound annual growth rate (CAGR) in the production of major cereals, pulses, oilseed, and commercial crops for all the 21 districts of Haryana state except the Charkhi Dadri district. The secondary data is used to examine the growth rate and is collected from the different issues of the Statistical Abstract of Haryana and Economical Survey of Haryana for the period of 15 years from 2004-05 to 2018-19.

INTRODUCTION

Haryana is the state which plays a major role in the Economy of India through agriculture performance and small industries. Economically, the income of 70 percent population depends on agriculture. Wheat, Rice, Jowar, Bajra, Gram, Sugarcane, Cotton, Oilseeds, Mustard, Potato, and Barely are the major crops of Haryana. Modern technology has removed the variation between Growth and Instability of production. More than 75 percent area is irrigated, using Canals and Tubewells with the modern technology of irrigation. It is also observed that Asia's largest and famous Chaudhary Charan Singh Agriculture University is also situated in the Hisar district of Haryana state. In the 1970's, Haryana contributed a major role in the Green Revolution process and become self-dependent in food production through agriculture sector. In literature, there are various researcher who contributed in the direction of growth and instability of major crops of India such as Saravanadurai and Kalaivani etc ^[1].

Chand and Raju, examined the study of instability in three major crops of Andhra Pradesh state before and after the commencement of economic improvements at district and state levels ^[2]. They have also estimated that the unpredictability in cropping prices may also affect the instability in total returns. Acharya et. al. using compound growth function determined the growth in production, productivity, and area of different major crops of Karnataka state using the secondary data for the period 1982-1983 to 2007-2008 ^[3]. They determined the remarkable positive growth in the area of fruits, spices, vegetables, and pulses and recorded a negative pattern of growth in cereals of the state. Further, in the production of commercial and oilseed crops they noted an insignificant growth. Paltasingh et. al. studied the growth and instability performance in the production of major crops of Odisha state ^[4]. Some policy was also suggested to improve agriculture production. In 2014, Sihmar examined that after the involvement of various reforms such as the Green Revolution, Land Reform, and minimum support price, a few crops such as Wheat and Rice gained more stability or growth and the other

crops like Cotton, Gram, Sugarcane, Maize, Barely, etc. shown a major decline in the production and area in Haryana district [5]. Savita and Kunal studied the growth analysis in the production of major crops in Karnataka state using the Compound Annual Growth Rate function [6]. They collected the secondary data for the period 1998-1999 to 2012-13 and analyzed a positive and significant annual growth. Further, in 2016, Patil et. al. determined the growth in production, area, and productivity of various major crops selected in Bengaluru urban division using the Compound Annual Growth Rate (CAGR) method [7]. Further, in Madhya Pradesh the growth in production, area, and yield was examined for the major Rabi and Kharif crops using Compound Annual Growth Function. Further, for more study of the growth in production, area and yield one may refer to [8-10].

This study deals with the Compound Annual Growth Rate in production of various major crops such as Wheat, Rice, Bajra, Barley, Jowar, Maize, Gram, Moong, Massar, Ground Nut, Sesamum, Mustard, Cotton, Sugarcane, Potato, etc. of Haryana state. The secondary data of 15 years from 2004-05 to 2018-19 is collected for the study from the different issues of the Statistical Abstract of Haryana and Economic Survey of Haryana [11,12]. The paper is divided into four sections. Section 1 presents the introduction and literature review about growth production. Section 2 gives a brief study of the data collection and methodology used in the paper. In Section 3, we present the main results of the paper followed by the conclusion of Section 4.

METHODOLOGY

Haryana state is considered as the major crop growing state in India. The income of 70 percent population of Haryana depends on agriculture. Therefore, this study uses the secondary data of major cereals, pulses, oilseeds, and commercial crops to analyze the growth performance in production. The secondary data for the period 2004-05 to 2018-19 is collected for all the 21 districts, that is, Bhiwani, Mahendergarh, Hisar, Jind, Sirsa, Fatehabad, Rewari, Gurugram, Faridabad, Jhajjar, Rohtak, Sonapat, Panipat, Karnal, Kaithal, Yamunanagar, Ambala, Panchkula, Mewat, Palwal, Kurukshetra of Haryana state. For further analysis, the period 2004-05 to 2018-19 is divided in to four sub-periods, that is, 2004-05 to 2008-09 (period-I), 2008-09 to 2012-13 (period-II), 2012-13 to 2016-17 (period-III) and 2016-17 to 2018-19 (period-IV). The total period of 15 years divided into four sub-periods describes the complete behavior of growth rate in agriculture production and return.

The Haryana is a rich state in agricultural production of almost all the major crops such as Wheat, Rice, Bajra, Barley, Jowar, Maize, Gram, Moong, Massar, Ground Nut, Sesamum, Mustard, Cotton, Sugarcane, Potato, etc. But depending on the water level, rainfall system, soil, and irrigation system the crop production differs district-wise. Further, it is observed that the district Charkhi Dadri was established on 16 November 2016, therefore due to the lack of agriculture data, we only present the growth performance of 21 districts. The secondary agricultural data for the 15 years for the period 2004-05 to 2018-19 is collected from different issues of the Statistical Abstract of Haryana and Economic Survey of Haryana.

Further, to examine the growth in agricultural production of major crops in all the districts, the Compound Annual Growth Rate (CAGR) formula is used. This method is assumed more efficient, effective, and popular to examine the average annual growth rate when we take the breaks in the time series data in sub-periods. Thus, for a single period we use the following

CAGR formula:

$$\text{CAGR in Percent} = \left[\left(\frac{EV}{IV} \right)^{1/n} - 1 \right] * 100$$

Where,

EV = End value of the crops for a given sub-period,
 IV = Initial value of the crops for a given sub-period,
 n = Number of periods taken in a subperiod - 1.

RESULTS AND DISCUSSION

Throughout, this section the compound annual growth in production of selected crops in various districts of Haryana is analyzed for different periods, that is, period-I (2004-05 to 2008-09), period-II (2008-09 to 2012-13), period-III (2012-13 to 2016-17) and period-IV (2016-17 to 2018-19).

Growth production in bhiwani

Bhiwani district occupies 4778 sq. km area and has the 1st position on the basis of size in Haryana state. It was established on 22 December 1972 on the map of Haryana state. The climate remains very hot in the summer season and very cold in the winter season. Economically, the income of the population basically depends on agriculture.

The production of the major crops such as Wheat, Rice, Bajra, Barley, Gram, Moong, Mustard, Cotton, and Sugarcane in Bhiwani district over the period 2008-09 to 2018-19 are shown in Table 1 and the growth in production is given in Table 2. The growth rate is calculated using the Compound Annual Growth Rate (CAGR) function. It is interesting to see that the growth rate (CAGR) in production increases for all the crops except Cotton in period-I as shown in Table 2. The production in Wheat is likely to increase from 415 thousand tones in the year 2004-05 into 500 thousand tones in the year 2018-19. But the CAGR in the production of Wheat increases in period-I (9.56%) and period-II (2.38%) while it decreases during the period-III (-5.72%) and period-IV (-1.85%). A remarkable decline in the CAGR value of total Foodgrain is noticed since 2008-09 as shown in Table 1. It is seen that the growth in production in Gram (2.77%), Moong (173.86%) and Mustard (9.88) plays a vital role to push up the agriculture production in period-IV. The CAGR value of Moong which was 1.53% in the period-I has increased to 173.86% in period-IV. The CAGR value of Mustard was recorded 1.96% per annum in period-I have increased to 9.88% per annum in the period-IV. Further, it is analyzed that the growth rate in Sugarcane for period-I (5.10%), period-II (20.82%), and period-III (17.76%) is positive and significant except in period-IV which gives a negative growth rate -9.20% per annum. The growth rate in production of Rice (33.90%), Bajra (6.52%), and Barley (45.20%) was positive and significant in period-I but a major decline is noticed in period-IV with Rice (-14.55%), Bajra (-33.73%), and Barley (-16.79%). Finally, the Cotton in period-II (32.92%) and period-III (3.49%) shows a remarkable increase in the annual growth rate but in the period-IV it gives a sharp decline with -14.22% per annum.

Table 1: Production in Major Crops in Bhiwani (in 000 tones)

Crops	Cereals				Pulses		Oilseeds	Commercial		Foodgrain
	Wheat	Rice	Bajra	Barley	Gram	Moong	Mustard	Cotton	S. Cane	
2004-05	415	14	188	9	57	1.6	198	176	5	685.5
2008-09	598	45	242	40	84	1.7	214	74	6.1	1016.6
2012-13	657	40	123	39	29	8.5	265	231	13	907.2
2016-17	519	63	189	13	16	1.2	193	265	25	805.7
2018-19	500	46	83	9	16.9	9	233	195	20	664.3

Data Source: Statistical Abstract of Haryana (Different Issue from 2004-05 to 2018-19)

Table 2: Compound Annual Growth Rate (CAGR) in Production in Bhiwani (in %)

Crops	2004-05 to 2008-09	2008-09 to 2012-13	2012-13 to 2016-17	2016-17 to 2018-19
Wheat	9.56	2.38	-5.72	-1.85
Rice	33.90	-2.90	12.03	-14.55
Bajra	6.52	-15.57	11.34	-33.73
Barley	45.20	-0.63	-24.02	-16.79
Gram	10.18	-23.35	-13.82	2.77
Moong	1.53	49.53	-38.70	173.86
Mustard	1.96	5.49	-7.62	9.88
Cotton	-19.48	32.92	3.49	-14.22
Sugarcane	5.10	20.82	17.76	-10.56
Foodgrain	10.35	-2.81	-2.92	-9.20
Data Source: Statistical Abstract of Haryana (Different Issue from 2004-05 to 2018-19)				

Growth Production in Mahendergarh

Mahendergarh district occupies 1899 sq. km area and has the 9th rank on the basis of size in Haryana state. The climate remains very hot in the summer season and too much cold in winter season. Economically, the income of the population basically depends on agriculture. The total agriculture area is 27400 ha approximate. The major crops in the Mahendergarh district are Wheat, Bajra, Gram, Mustard, and Cotton.

The growth rate in the production of major crops is determined using the Compound Annual Growth Rate function. Table 3 gives the production in thousand tons of major crops and Table 4 presents the CAGR (in percentage) in the production of major crops. Therefore, from Table 3 it is clear that the total Foodgrain is likely to increase from 261.1 thousand tons in 2004-05 to 430.4 thousand tons in 2018-19 showing an increase of 64.84 percent. While the CAGR of Foodgrain in period-I (11.13%), period-II (1.26%), and period-III (4.27%) shows positive and significant growth except period-IV with a negative CAGR -6.73% as shown in Table 3. The production in Wheat gives a continued decline from 415 thousand tons in 2004-05 to 211 thousand tons in 2018-19. The CAGR value of Wheat in period-I (-16.58%) and period-IV (-5.44%) is detected negative and in period-II (0.49%) and period-III (3.58%) is shown positive and more expressive. The production in Bajra is also impressive. It increases from 102 thousand tons in the year 2004-05 to 203 thousand tons in the year 2018-19 and gives a positive and powerful CAGR value in period-I, II, and III. The growth rate in cotton shows a remarkable increase in period-II (49.53%), period-III (48.02%), and period-IV (45.06%) except the period-I with negative growth -48.75% per annum. Further, the Gram and Mustard show an increasing behavior in production as shown in Table 3. While the CAGR of gram in period-IV represents a sharp decline in the production and mustard achieved a major increase of 8.84% in the period-IV after a sharp decay in period-II and III.

Table 3: Production in Major Crops in Mahendergarh (in 000 tones)

Crops Years	Cereals		Pulses	Oilseeds	Commercial	Foodgrain
	Wheat	Bajra	Gram	Mustard	Cotton	
2004-05	415	102	4	119	29	261.1
2008-09	201	182	12	173	2	398.2
2012-13	205	198	10	165	10	418.6
2016-17	236	228	15.3	163	48	494.8
2018-19	211	203	14.1	193.1	101	430.4
Data Source: Statistical Abstract of Haryana (Different Issue from 2004-05 to 2018-19)						

Table 4: Compound Annual Growth Rate (CAGR) in Production in Mahendergarh (in %)

Crops	2004-05 to 2008-09	2008-09 to 2012-13	2012-13 to 2016-17	2016-17 to 2018-19
Wheat	-16.58	0.49	3.58	-5.44
Bajra	15.58	2.13	3.59	-5.64
Gram	31.61	-4.46	11.22	-4.00
Mustard	9.81	-1.18	-0.30	8.84
Cotton	-48.75	49.53	48.02	45.06
Foodgrain	11.13	1.26	4.27	-6.73
Data Source: Statistical Abstract of Haryana (Different Issue from 2004-05 to 2018-19)				

Growth production in hisar

Hisar district occupies an area of 3983 square kilometers and has 3rd position in the Haryana state on the basis of size. The agricultural production is the major source of income for the population. Hisar is considered as the largest district, which grows almost all the crops such as Wheat, Rice, Bajra, Barley, Gram, Moong, Mustard, Cotton, and Sugarcane. In this section, we analyze the production and compound annual growth rate (CAGR) of major crops as given in Table 5 and 6. In the period of 15 years from 2004-05 to 2018-19 the total Foodgrain production increases from 1034.6 thousand tones in the year 2004-05 to 1376 thousand tones in the year 2018-19 showing an increase of 32.99 percent as shown in Table 5. Also, the growth rate CAGR in the production of total Foodgrain shows a remarkable increase, that is, 7.79% in the period-I, 3.44% in the period-III, and 0.14% in the period-IV except for the period-II with a decrease in growth -3.75% per annum. The growth in Wheat production is likely to decrease from 6.38% in period-I to 0.97% in the period-IV but the overall rate is still positive and significant except the period-II with a negative growth rate of -2.16% per annum. The production in Rice gives a surprising increase from 63 thousand tones in the year 2004-05 to 188 thousand tones in the year 2018-19 while the value of Compound Annual Growth Rate in Period-I, III and IV is positive and expressive. The growth rate in production of Bajra shows a sharp decline from Period-I (7.06%) to Period-IV (-19.82%) and the Barley shows the decline from Period-I (30.60%) to Period-IV (-20.23%). While in Gram and Moong the CAGR achieved a remarkable increase of 76.43% and 60.36% in period-IV, respectively. Further, it is interesting to see that the CAGR in the production of Mustard shows an appreciable increase in all the sub-periods. Cotton also gives a significant growth with positive CAGR value, 0.38% in the period-I, 3.06% in the period-II, and 0.60% in the period-IV except for the period-III with negative value of -5.73% per annum.

Table 5: Production in Major Crops in Hisar (in 000 tones)

Crops Years	Cereals				Pulses		Oilseeds	Commercial		Foodgrain
	Wheat	Rice	Bajra	Barley	Gram	Moong	Mustard	Cotton	S. Cane	
2004-05	841	63	102	11	14	3.3	81	461	9	1034.6
2008-09	1077	132	134	32	18	3.3	90.2	468	5	1396.7
2012-13	987	102	60	19	5	25.5	102.8	528	6	1198.6
2016-17	1075	186	84	11	6.2	3.5	121	417	13	1372.2
2018-19	1096	188	54	7	19.3	9	163.4	422	11	1376
Data Source: Statistical Abstract of Haryana (Different Issue from 2004-05 to 2018-19)										

Table 6: Compound Annual Growth Rate (CAGR) in Production in Hisar (in %)

Crops	2004-05 to 2008-09	2008-09 to 2012-13	2012-13 to 2016-17	2016-17 to 2018-19
Wheat	6.38	-2.16	2.16	0.97
Rice	20.31	-6.24	16.21	0.54
Bajra	7.06	-18.20	8.78	-19.82
Barley	30.60	-12.22	-12.77	-20.23
Gram	6.48	-27.40	5.53	76.43
Moong	0.00	66.73	-39.13	60.36
Mustard	2.73	3.32	4.16	16.21
Cotton	0.38	3.06	-5.73	0.60
Sugarcane	-13.67	4.66	21.32	-8.01
Foodgrain	7.79	-3.75	3.44	0.14

Data Source: Statistical Abstract of Haryana (Different Issue from 2004-05 to 2018-19)

Growth production in jind

Jind is the oldest district of Haryana state. It occupies 2702 square kilometer area and gets 4th position in Haryana on the basis of size. The climate remains hot in the summer season and very cold in the winter season. Wheat, Rice, Bajra, Barley, Mustard, Cotton, and Sugarcane are among the major crops and Pulses, Potato, Ground Nut, Chillies, Onions and Vegetables are minor crops in the Jind district. Table 7 gives the production of major crops in thousand tones and Table 8 shows the CAGR of major crops in production in percentage.

Table 7 shows that the total Foodgrain increases from 1131 thousand tones in the year 2004-05 to 1534 thousand tones in the year 2018-19 with an increase of 35.63 percent per annum. Also, the Compound Annual Growth Rate of Foodgrain shows a remarkable growth of 5.22% in the period-I, 2.74% in the period-III, and 3.22% in the period-IV and a sharp decline in the period-II of -1.74%. Also, the production in Wheat increases from 859 thousand tones in the year 2004-05 to 1126 thousand tones in the year 2018-19 and the value of CAGR in period-I, III, and IV shows a significant growth. Similarly, the production of Rice increases continuously from 201 thousand tones in the year 2004-05 to 387 thousand tones in the year 2018-19 with an increase of 92.53 percent. Therefore, it is analyzed that the Wheat and Rice both play a major role to improve the total agriculture production. It is also remarkable that the CAGR of Rice production is positive in all the subperiods, that is, 5.61% in the period-I, 6.20% in the period-II, 2.35% in the period-III, and 5.30% in the period-IV. The growth production in Bajra is unsatisfactory as it shows a sharp decline in the period-II, III, and IV. But in the case of Mustard there is a significant increase in the CAGR value from -13.40% in the period-I to 32.29% in the period-IV. Further, in Cotton the production behavior is also fluctuating and no sharp growth is detected in the whole period 2004-05 to 2018-19. Sugarcane is also a major commercial crop of Jind district but still it does not show any major growth in production. But the CAGR value is positive with 5.22% in the period-I, 2.74% in the period-III and 3.22% in the period-IV and shows a minor decline of -1.74% in the period-II.

Growth production in sirsa

Sirsa district was established on 26 August 1975 and is closely related to the era of Mahabharata. It covers a total of 4277 square kilometer area and is on 2nd position in Haryana on the basis of size. The climate is similar to the other district of North India. Wheat, Rice, Bajra, Barley, Gram, Moong, Ground Nut, Mustard, Cotton, and Potato are the major crops in Sirsa. Table 9 gives the production of major crops in thousand tones and Table 10 shows the CAGR of major crops in production in percentage.

Table 7: Production in Major Crops in Jind (in 000 tones)

Crops Years	Cereals				Oilseed	Commercial		Foodgrain
	Wheat	Rice	Bajra	Barley	Mustard	Cotton	Sugarcane	
2004-05	859	201	67	3	16	148	37	1131
2008-09	1030	250	102	3	9	153	11.6	1386.4
2012-13	922	318	47	4	8	244	19	1292.4
2016-17	1056	349	34	0	8	175	38	1440
2018-19	1126	387	20	1	14	162	37	1534.1

Data Source: Statistical Abstract of Haryana (Different Issue from 2004-05 to 2018-19)

Table 8: Compound Annual Growth Rate (CAGR) in Production in Jind (in %)

Crops	2004-05 to 2008-09	2008-09 to 2012-13	2012-13 to 2016-17	2016-17 to 2018-19
Wheat	4.64	-2.73	3.45	3.26
Rice	5.61	6.20	2.35	5.30
Bajra	11.08	-17.61	-7.78	-23.30
Barley	0.00	7.46	-29.29	0.00
Mustard	-13.40	-2.90	0.00	32.29
Cotton	0.83	12.38	-7.97	-3.79
Sugarcane	-25.17	13.13	18.92	-1.32
Foodgrain	5.22	-1.74	2.74	3.22

Data Source: Statistical Abstract of Haryana (Different Issue from 2004-05 to 2018-19)

Table 9 shows a major breakthrough in the production of total foodgrain since 2004-05. The production increases from 1158.1 thousand tones in the 2004-05 to 1828.1 thousand tones in the year 2018-19. Wheat and Rice played a major role to push up the total growth in agriculture production. The production of Wheat was 970 thousand tones in the year 2004-05 and increased to 1484 thousand tones in the year 2018-19 with an increase of 52.98 percent. While the CAGR value in all the periods is positive and more significant except the period-IV shows a minor negative CAGR value -2.06% per annum. Similarly, the production in Rice also increases rapidly from 157 thousand tones in the year 2004-05 to 317 thousand tones in the year 2018-19 and shows a remarkable positive growth rate value in all the subperiods, that is, 5.70% in the period-I, 4.08% in the period-II, 8.18% in the period-III and 0.32% in the period-IV. The overall CAGR in production of Bajra is also satisfactory as it gives an increasing positive growth in the period-III (31.61%) and period-IV (10.55%) as compared to period-I (5.74%). The production in Barely has shown a sharp decline since 2008-09 with negative CAGR value in the period-II, III, and IV. The production of Moong is remarkable in the period-II with a CAGR value 50.59% and after that the period-III and IV it shows a sharp decline. The production in Mustard increases from 93 thousand tones in the year 2004-05 to 122.1 thousand tones in 2018-19 which indicates the major fluctuation and also the CAGR value 36.01% in the period-IV shows striking growth in production. The Ground Nut also responded wonderfully in the period-II and period-III with 65.49% and 22.70% CAGR value in the production, but after that a major decline is noticed in period-IV with CAGR value -21.41%.

Table 9: Production in Major Crops in Sirsa (in 000 tones)

Crops Years	Cereals				Pulses		Oil seeds		Commercial	Foodgrain
	Wheat	Rice	Bajra	Barley	Gram	Moong	G. Nut	Mustard	Cotton	
2004-05	970	157	8	12	10	0.6	0.4	93	763	1158.1
2008-09	1394	196	10	46	9	0.7	0.2	70.2	754	1655.9
2012-13	1423	230	3	31	6	3.6	1.5	71	899	1697.3
2016-17	1547	315	9	11	5.1	0.3	3.4	66	731	1897.2
2018-19	1484	317	11	10	5.9	0.2	2.1	122.1	636	1828.1

Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)

Table 10: Compound Annual Growth Rate (CAGR) in Production in Sirsa (in %)

Crops	2004-05 to 2008-09	2008-09 to 2012-13	2012-13 to 2016-17	2016-17 to 2018-19
Wheat	9.49	0.52	2.11	-2.06
Rice	5.70	4.08	8.18	0.32
Bajra	5.74	-25.99	31.61	10.55
Barley	39.92	-9.40	-22.82	-4.65
Gram	-2.60	-9.64	-3.98	7.56
Moong	3.93	50.59	-46.27	-18.35
Ground Nut	-15.91	65.49	22.70	-21.41
Mustard	-6.79	0.28	-1.81	36.01
Cotton	-0.30	4.50	-5.04	-6.72
Foodgrain	9.35	0.62	2.82	-1.84

Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)

Growth production in fatehabad

Agriculture production is assumed as the backbone of the income for the population of Fatehabad district. The Fatehabad district was established on 15 July 1997 before that it was a part of Hisar district. Geographically, it occupies an area of 2538 square kilometer. The major crops are Wheat, Rice, Gram, Moong, Cotton, Sugarcane and Mustard.

The agricultural production of major crops is shown in Table 11 for the period 2004-05 to 2018-19 and the Compound Annual Growth Rate (CAGR) of the production is presented in Table 12 using four sub-periods from 2004-05 to 2008-09, 2008-09 to 2012-13, 2012-13 to 2016-17 and 2016-17 to 2018-19. The results in Table 11 shows that the production in total foodgrain, a collection of cereals and pulses recorded a remarkable growth from 1037.6 thousand tones in the year 2004-05 to 1509.8 thousand tones in the year 2018-19. Also, the Table 12 shows that the CAGR of Foodgrain production is positive in the period-I with 6.61% per annum, period-III with 4.18% per annum, and period-IV with 0.36% per annum, except for the period-II with a negative CAGR -1.30% per annum. The Wheat and Rice have played a vital role to push up the agricultural production because they show a major increase of 727 thousand tones in the year 2004-05 to 1008 thousand tones in the year 2018-19 and from 157 thousand tones in the year 2004-05 to 493 thousand tones in the year 2018-19, respectively. The table also shows

that the Rice has a consistent positive CAGR value throughout the study period. In case of Bajra, Barley and Cotton the production trend shows a continuous decline from 4.09% in the period-I to -33.33% in the period-IV, 36.78% in the period-I to -29.29% in the period-IV, and -2.83 in the period-I to -4.74 in the period-IV, respectively. In case of Mustard the Table shows a remarkable positive growth of 41.42% per annum in the period-IV followed by -5.74% per annum in the period-I, 6.09% per annum in the period-II and a steady state in the period-III. The Potato a commercial crop achieved a significant growth in the period-IV with a positive Compound Annual Growth Rate of 106.47% per annum.

Growth production in rewari

Like Sirsa district the Rewari is also has an interesting story in the era of Mahabharata. On the map of Haryana, it was established on 1st November 1989. Geographically, it has 1594 square kilometer area and has 13th rank in the State on the basis of land area. The industries are the main source of income for the population. The people mainly use the pump sets for the irrigation of agricultural land. The Pulses, Wheat, Rice Bajra Barley, Mustard, Cotton are mainly grown in the agriculture production of Rewari.

Table 11: Production in Major Crops of Fatehabad (in 000 tonnes)

Crops Years	Cereals				Pulses	Oilseeds	Commercial		Foodgrain
	Wheat	Rice	Bajra	Barley	Moong	Mustard	Potato	Cotton	
2004-05	727	157	23	6	0.4	19	6.5	424	1037.6
2008-09	952	339	27	21	0.5	15	3.7	378	1340.6
2012-13	880	370	7	12	1.5	19	4.7	358	1272.4
2016-17	995	486	9	4	0.1	19	3.8	270	1498.9
2018-19	1008	493	4	2	0.2	38	16.2	245	1509.8

Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)

Table 12: Compound Annual Growth Rate (CAGR) in Production in Fatehabad (in %)

Crops	2004-05 to 2008-09	2008-09 to 2012-13	2012-13 to 2016-17	2016-17 to 2018-19
Wheat	6.97	-1.95	3.12	0.65
Rice	21.22	2.21	7.06	0.72
Bajra	4.09	-28.64	6.48	-33.33
Barley	36.78	-13.06	-24.02	-29.29
Moong	5.74	31.61	-49.19	41.42
Potato	-13.14	6.16	-5.18	106.47
Mustard	-5.74	6.09	0.00	41.42
Cotton	-2.83	-1.35	-6.81	-4.74
Foodgrain	6.61	-1.30	4.18	0.36

Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)

Table 13 shows that the cereal crops in Rewari such as Wheat, Rice, Bajra and Barley have recorded a major increase in production. The total Foodgrain (cereals and pulses) contributes from 268.1 thousand tonnes in the year 2004-05 to 346.5 thousand tonnes in the year 2018-19 followed by Wheat from 186 thousand tonnes in the year 2004-05 to 203 thousand tonnes in the year 2018-19, Rice from 3 thousand tonnes in the year 2004-05 to 6 thousand tonnes in the year 2018-19, and Bajra from 78 thousand tonnes in the year 2004-05 to 135 thousand tonnes in the year 2018-19, etc. The CAGR of Foodgrain production is recorded positive and high growth rate of 6.29% per annum in the period-I and 5.25% per annum in the period-III while in the period-IV it gives a large decline with growth rate -8.29% per annum. In case of Cotton there is a consistent positive growth rate in the period-II, III,

and IV with 56.51%, 23.59% and 10.19%, per annum, respectively. Similarly, the production in Mustard also shows a positive CAGR in the period-I, II, and IV except for the period-II. In the case of Pulses, a remarkable increase is recorded in the period-II and period-III with a significant positive growth rate of 56.51% and 23.59% per annum, respectively, while a major decline is also noted in the period-IV of -82.46% per annum. In case of Barely a significant growth is achieved in the period-I of 62.66% per annum and a stable production is noted in the period-II with 0% annual growth, that means, it has the same production throughout this period, but after that a major decline is determined in the period-II, III, and IV. The production of Bajra gives a fluctuating growth rate showing negative and positive CAGR value in all the sub-periods. The CAGR of Wheat shows a continuous growth in the period-I, II, and III with a sharp decline in the period-IV of -8.22% per annum.

Table 13: Production in Major Crops of Rewari (in 000 tonnes)

Crops Years	Cereals				Pulses	Oilseeds	Commercial	Foodgrain
	Wheat	Rice	Bajra	Barley	Pulses	Mustard	Cotton	
2004-05	186	3	78	1	1.1	100	27	268.1
2008-09	208	5	121	7	0.2	131	1	342.2
2012-13	222	7	98	7	1.8	145	6	335.8
2016-17	241	4	149	5	13	144	14	412
2018-19	203	6	135	2	0.4	165	17	346.5

Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)

Table 14: Compound Annual Growth Rate (CAGR) in Production in Rewari (in %)

Crops	2004-05 to 2008-09	2008-09 to 2012-13	2012-13 to 2016-17	2016-17 to 2018-19
Wheat	2.83	1.64	2.07	-8.22
Rice	13.62	8.78	-13.06	22.47
Bajra	11.60	-5.13	11.04	-4.81
Barley	62.66	0.00	-8.07	-36.75
Pulses	-34.70	73.21	63.93	-82.46
Mustard	6.98	2.57	-0.17	7.04
Cotton	-56.13	56.51	23.59	10.19
Foodgrain	6.29	-0.47	5.25	-8.29

Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)

Growth Production in Gurugram

The district Gurugram occupies an area of 1258 square kilometer and gets 19th position in the state based on the area. It was established by the Haryana Government on 15th August 1979. The primary source of income of the population depends on the industries. Basically, it consists of the major industries and offices of the companies. Wheat, Rice Bajra Barley, Mustard, Pulses, Sesamum are the major crops in Gurgaon district.

Table 15 shows a major decline in the production of Foodgrain, Cereals, and Mustard in the period 2004-05 to 2018-19. The Foodgrain decline from 501.3 thousand tones in the year 2004-05 to 306.2 thousand tones in the year 2018-19 followed by Wheat, Rice, Barely and Mustard. But the growth rate in production of Foodgrain in period-II and IV shows a positive CAGR value of 1.20% per annum and 0.28% per annum, respectively while it is noticed that there was a big decline in the period-I with -12.74% per annum. Similarly, a major decline is also examined in the production of Wheat from 407 thousand tones in the year 2004-05 to 214 thousand tones in the year 2018-19. Periodically, it shows a decline of -15.55% per annum in the period-I, -0.24% per annum in the period-II and -2.26% per annum in the period-IV. In the case of Rice production there is a major decline with negative growth rate -18.35% per annum in the period-I and -3.39% per annum in the period-IV while it gives a significant growth in the period-II with CAGR of 12.91% per annum and in the period-III with CAGR of 3.64% per annum. But the production of Bajra gives a major improvement with in the growth rate from a stable state in the period-I to 11.99% in the period-IV and the Barely shows a continuous decline in the production in the period-I, II and III with the largest decline of -22.54% per annum in the period-IV. The production in Mustard shows a significant positive growth rate of 28.45% in the period-IV. In the case of Pulses and Sesamum a consistent growth in production is recorded in the period-IV. On the other hand, Sesamum gives a remarkable production in the period-I and period-III with a CAGR value 10.67% per annum each.

Table 15: Production in Major Crops in Gurugram (in 000 tones)

Crops Years	Cereals				Pulses	Oilseeds		Foodgrain
	Wheat	Rice	Bajra	Barley	Pulses	Sesamum	Mustard	
2004-05	407	18	67	4	2.3	0.2	74	501.3
2008-09	207	8	67	7	0.7	0.3	27	290.7
2012-13	205	13	69	9	7.6	0.2	28	304.9
2016-17	224	15	59	5	0.4	0.3	20	304.4
2018-19	214	14	74	3	0.4	0.3	33	306.1

Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)

Table 16: Compound Annual Growth Rate (CAGR) in Production in Gurugram (in %)

Crops	2004-05 to 2008-09	2008-09 to 2012-13	2012-13 to 2016-17	2016-17 to 2018-19
Wheat	-15.55	-0.24	2.24	-2.26
Rice	-18.35	12.91	3.64	-3.39
Bajra	0.00	0.74	-3.84	11.99
Barley	15.02	6.48	-13.67	-22.54
Pulses	-25.73	81.52	-52.10	0.00
Sesamum	10.67	-9.64	10.67	0.00
Mustard	-22.28	0.91	-8.07	28.45
Foodgrain	-12.74	1.20	-0.04	0.28

Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)

Growth production in faridabad

Faridabad district was established in 1979, but before that it was the part of Gurugram district. It covers an area of 741 square kilometer and gets the 21st position in the Haryana on the basis of size. The major crops of the district are Wheat, Rice, Jowar, Bajra, Mustard and Sugarcane. But the income of the population depends on the industries. Table 17 and 18 shows the production and the growth rate in the production of major crops for the period 2004-05 to 2018-19. From the Table 18 it is clear that there is a major decline in the production of total Foodgrain followed by Cereals, Oilseeds and Commercial crops. The Food grain attains a decline from 617.9 thousand tones in the year 2004-05 to 199.5 thousand tones in the year 2018-19 with a growth rate of -67.71%. While a negative growth rate of -25.27% and -2.52% is recorded in the period-I and II and the significant positive growth rate of 1.57% and 3.79% is noted in the period-III and period-IV. The largest decline is recorded in Mustard and Sugarcane with the growth rate of -79.15% per annum and -50% per annum in the period-IV, respectively. It is also remarkable that the Mustard shows a major increase of 118.99% in the period-III. Further, in case of Rice and Bajra a continuous growth is recorded from period-I to period-IV.

Table 17: Production in Major Crops in Faridabad (in 000 tones)

Crops Years	Cereals			Oilseeds	Commercial	Foodgrain
	Wheat	Rice	Bajra	Mustard	Sugarcane	
2004-05	526	68	12	6	29	617.9
2008-09	159	22	7	2	5.4	192.7
2012-13	141	25	5	1	7	174
2016-17	141	33	9	23	8	185.2
2018-19	152	36	10	1	2	199.5

Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)

Table 18: Compound Annual Growth Rate (CAGR) in Production in Faridabad (in %)

Crops	2004-05 to 2008-09	2008-09 to 2012-13	2012-13 to 2016-17	2016-17 to 2018- 19
Wheat	-25.85	-2.96	0.00	3.83
Rice	-24.58	3.25	7.19	4.45
Bajra	-12.61	-8.07	15.83	5.41
Mustard	-24.02	-15.91	118.99	-79.15
Sugarcane	-34.31	6.70	3.39	-50.00
Foodgrain	-25.27	-2.52	1.57	3.79

Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)

Growth production in Jhajjar

Jhajjar district was emerged as separate district on 15 July 1997 on the map of Haryana. It has an area of 1874 square kilometer and gets 10th position in Haryana state on the basis of land. The climate remains very hot in summer and moderately cold in winter. Wheat, Rice, Jowar, Bajra, Barley, Mustard, Cotton and Sugarcane are considered as the major crops of Jhajjar district. But the income of the population depends on the industries. Although, the Table 20 shows that there is a significant growth in the production of total Foodgrain from 370.4 thousand tones in the year 2004-05 to 721.3 thousand tones in the year 2018-19 followed by the major increment in Wheat, Rice, Bajra, Barley, Cotton and Sugarcane. Therefore, the Table 20 shows a continuous positive growth with CAGR value 8.92% in the period-I, 2.08% in the period-II, 6.41% in the period-III and with a minor negative growth -0.3% in the period-IV. The production in Wheat shows a remarkable growth from 302 thousand tones in the year 2004-05 to 501 thousand in the year 2018-19 but the Compound Annual Growth Rate is fluctuating in the period-I, II, III, and IV. The Rice shows a significant positive growth in the period-I with 19.84% per annum, period-II

with 12.57% per annum, period-III with 10.84% per annum, and period-IV with 20.9% per annum. Similarly, the growth production in Bajra is also positive throughout the period-I, II, III, and IV. The Barely gives a major decline in production of -24.79% in the period-III and -13.4 in the period-IV. The Mustard crop is not performing well in the period-I, II, and III but shows a growth of 5% in the period-IV. Further, the Cotton is showing a remarkable growth with CAGR value 23.59% in the period-II, 20.99% in the period-III, and 46.1 in the period-IV. The overall production in sugarcane is also satisfactory as it attains Compound Annual Growth Rate of -16.38% in the period-I, then increase with 44.15% in the period-II and with 4.89% in the period-III, and then again decreases in the period-IV with CAGR value of -14% per annum.

Table 19: Production in Major Crops in Jhajjar (in 000 tones)

Crops Years	Cereals					Oilseeds	Commercial		Foodgrain
	Wheat	Rice	Jowar	Bajra	Barley	Mustard	Cotton	Sugarcane	
2004-05	302	16	7	36	3	73	7	9	370.4
2008-09	409	33	10	44	15	65	3	4.4	521.4
2012-13	377	53	6	56	25	59	7	19	566.2
2016-17	545	80	5	88	8	58	15	23	726
2018-19	501	117	4	93	6	64	32	17	721.3

Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)

Table 20: Compound Annual Growth Rate (CAGR) in Production in Jhajjar (in %)

Crops	2004-05 to 2008-09	2008-09 to 2012-13	2012-13 to 2016-17	2016-17 to 2018-19
Wheat	7.88	-2.02	9.65	-4.1
Rice	19.84	12.57	10.84	20.9
Jowar	9.33	-11.99	-4.46	-10.6
Bajra	5.14	6.21	11.96	2.8
Barley	49.53	13.62	-24.79	-13.4
Mustard	-2.86	-2.39	-0.43	5.0
Cotton	-19.09	23.59	20.99	46.1
Sugarcane	-16.38	44.15	4.89	-14.0
Foodgrain	8.92	2.08	6.41	-0.3

Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)

Growth production in Rohtak

The district Gurugram occupies an area of 1258 square kilometer and gets 19th position in the state based on the area. It was established by the Haryana Government on 15th August 1979. The primary source of income of the population depends on the industries. Basically, it consists of the major industries and offices of the companies. Wheat, Rice Bajra Barley, Mustard, Pulses, Sesamum are the major crops in Gurgaon district.

Table 15 shows a major decline in the production of Foodgrain, Cereals, and Mustard in the period 2004-05 to 2018-19. The Foodgrain decline from 501.3 thousand tones in the year 2004-05 to 306.2 thousand tones in the year 2018-19 followed by Wheat, Rice, Barely and Mustard. But the growth rate in production of Foodgrain in

period-II and IV shows a positive CAGR value of 1.20% per annum and 0.28% per annum, respectively while it is noticed that there was a big decline in the period-I with -12.74% per annum. Similarly, a major decline is also examined in the production of Wheat from 407 thousand tones in the year 2004-05 to 214 thousand tones in the year 2018-19. Periodically, it shows a decline of -15.55% per annum in the period-I, -0.24% per annum in the period-II and -2.26% per annum in the period-IV. In the case of Rice production there is a major decline with negative growth rate -18.35% per annum in the period-I and -3.39% per annum in the period-IV while it gives a significant growth in the period-II with CAGR of 12.91% per annum and in the period-III with CAGR of 3.64% per annum. But the production of Bajra gives a major improvement with in the growth rate from a stable state in the period-I to 11.99% in the period-IV and the Barely shows a continuous decline in the production in the period-I, II and III with the largest decline of -22.54% per annum in the period-IV. The production in Mustard shows a significant positive growth rate of 28.45% in the period-IV. In the case of Pulses and Sesamum a consistent growth in production is recorded in the period-IV. On the other hand, Sesamum gives a remarkable production in the period-I and period-III with a CAGR value 10.67% per annum each.

Table 15: Production in Major Crops in Gurugram (in 000 tones)

Crops Years	Cereals				Pulses	Oilseeds		Foodgrain
	Wheat	Rice	Bajra	Barley	Pulses	Sesamum	Mustard	
2004-05	407	18	67	4	2.3	0.2	74	501.3
2008-09	207	8	67	7	0.7	0.3	27	290.7
2012-13	205	13	69	9	7.6	0.2	28	304.9
2016-17	224	15	59	5	0.4	0.3	20	304.4
2018-19	214	14	74	3	0.4	0.3	33	306.1

Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)

Table 16: Compound Annual Growth Rate (CAGR) in Production in Gurugram (in %)

Crops	2004-05 to 2008-09	2008-09 to 2012-13	2012-13 to 2016-17	2016-17 to 2018-19
Wheat	-15.55	-0.24	2.24	-2.26
Rice	-18.35	12.91	3.64	-3.39
Bajra	0.00	0.74	-3.84	11.99
Barley	15.02	6.48	-13.67	-22.54
Pulses	-25.73	81.52	-52.10	0.00
Sesamum	10.67	-9.64	10.67	0.00
Mustard	-22.28	0.91	-8.07	28.45
Foodgrain	-12.74	1.20	-0.04	0.28

Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)

Growth production in Faridabad

Faridabad district was established in 1979, but before that it was the part of Gurugram district. It covers an area of 741 square kilometer and gets the 21st position in the Haryana on the basis of size. The major crops of the district are Wheat, Rice, Jowar, Bajra, Mustard and Sugarcane. But the income of the population depends on the industries. Table 17 and 18 shows the production and the growth rate in the production of major crops for the

period 2004-05 to 2018-19. From the Table 18 it is clear that there is a major decline in the production of total Foodgrain followed by Cereals, Oilseeds and Commercial crops. The Foodgrain attains a decline from 617.9 thousand tones in the year 2004-05 to 199.5 thousand tones in the year 2018-19 with a growth rate of -67.71%. While a negative growth rate of -25.27% and -2.52% is recorded in the period-I and II and the significant positive growth rate of 1.57% and 3.79% is noted in the period-III and period-IV. The largest decline is recorded in Mustard and Sugarcane with the growth rate of -79.15% per annum and -50% per annum in the period-IV, respectively. It is also remarkable that the Mustard shows a major increase of 118.99% in the period-III. Further, in case of Rice and Bajra a continuous growth is recorded from period-I to period-IV.

Table 17: Production in Major Crops in Faridabad (in 000 tones)

Crops Years	Cereals			Oilseeds	Commercial	Foodgrain
	Wheat	Rice	Bajra	Mustard	Sugarcane	
2004-05	526	68	12	6	29	617.9
2008-09	159	22	7	2	5.4	192.7
2012-13	141	25	5	1	7	174
2016-17	141	33	9	23	8	185.2
2018-19	152	36	10	1	2	199.5

Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)

Table 18: Compound Annual Growth Rate (CAGR) in Production in Faridabad (in %)

Crops	2004-05 to 2008-09	2008-09 to 2012-13	2012-13 to 2016-17	2016-17 to 2018-19
Wheat	-25.85	-2.96	0.00	3.83
Rice	-24.58	3.25	7.19	4.45
Bajra	-12.61	-8.07	15.83	5.41
Mustard	-24.02	-15.91	118.99	-79.15
Sugarcane	-34.31	6.70	3.39	-50.00
Foodgrain	-25.27	-2.52	1.57	3.79

Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)

Growth production in Jhajjar

Jhajjar district was emerged as separate district on 15 July 1997 on the map of Haryana. It has an area of 1874 square kilometer and gets 10th position in Haryana state on the basis of land. The climate remains very hot in summer and moderately cold in winter. Wheat, Rice, Jowar, Bajra, Barley, Mustard, Cotton and Sugarcane are considered as the major crops of Jhajjar district. But the income of the population depends on the industries. Although, the Table 20 shows that there is a significant growth in the production of total Foodgrain from 370.4 thousand tones in the year 2004-05 to 721.3 thousand tones in the year 2018-19 followed by the major increment in Wheat, Rice, Bajra, Barley, Cotton and Sugarcane. Therefore, the Table 20 shows a continuous positive growth with CAGR value 8.92% in the period-I, 2.08% in the period-II, 6.41% in the period-III and with a minor negative growth -0.3% in the period-IV. The production in Wheat shows a remarkable growth from 302 thousand tones in the year 2004-05 to 501 thousand in the year 2018-19 but the Compound Annual Growth Rate is fluctuating in the period-I, II, III, and IV. The Rice shows a significant positive growth in the period-I with 19.84% per annum, period-II with 12.57% per annum, period-III with 10.84% per annum, and period-IV with 20.9% per annum. Similarly, the growth production in Bajra is also positive throughout the period-I, II, III, and IV. The Barely gives a major decline in production of -24.79% in the period-III and -13.4 in the period-IV. The Mustard crop is not performing well in the

period-I, II, and III but shows a growth of 5% in the period-IV. Further, the Cotton is showing a remarkable growth with CAGR value 23.59% in the period-II, 20.99% in the period-III, and 46.1 in the period-IV. The overall production in sugarcane is also satisfactory as it attains Compound Annual Growth Rate of -16.38% in the period-I, then increase with 44.15% in the period-II and with 4.89% in the period-III, and then again decreases in the period-IV with CAGR value of -14% per annum.

Table 19: Production in Major Crops in Jhajjar (in 000 tones)

Crops Years	Cereals					Oilseed	Commercial		Food grain
	Wheat	Rice	Jowar	Bajra	Barley	Mustard	Cotton	Sugarcane	
2004-05	302	16	7	36	3	73	7	9	370.4
2008-09	409	33	10	44	15	65	3	4.4	521.4
2012-13	377	53	6	56	25	59	7	19	566.2
2016-17	545	80	5	88	8	58	15	23	726
2018-19	501	117	4	93	6	64	32	17	721.3

Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)

Table 20: Compound Annual Growth Rate (CAGR) in Production in Jhajjar (in %)

Crops	2004-05 to 2008-09	2008-09 to 2012-13	2012-13 to 2016-17	2016-17 to 2018-19
Wheat	7.88	-2.02	9.65	-4.1
Rice	19.84	12.57	10.84	20.9
Jowar	9.33	-11.99	-4.46	-10.6
Bajra	5.14	6.21	11.96	2.8
Barley	49.53	13.62	-24.79	-13.4
Mustard	-2.86	-2.39	-0.43	5.0
Cotton	-19.09	23.59	20.99	46.1
Sugarcane	-16.38	44.15	4.89	-14.0
Foodgrain	8.92	2.08	6.41	-0.3

Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)

Growth production in Rohtak

The Rohtak district was founded on 1st November 1966 on the map of Haryana having an area of 1745 square kilometer. The source of income of the population depends on small industries as well as agriculture. The monsoon season is the major reason of rainfall and it was 340.7 mm in the year 2018-2019. Table 20 shows that among all the cereals in Rohtak district Wheat and Rice gained the major growth and recorded a significant positive rate.

Therefore, the total Foodgrain gets a remarkable increase from 392.5 thousand tones in the year 2004-05 to 636.8 thousand tones in the year 2018-19 and attains positive Compound Annual Growth Rate except for the period-II. Further, the Table 20 shows that the Wheat crop gained a significant growth from 320 thousand tones in the year 2004-05 to 476 thousand tones in the year 2018-19 but the Compound Annual Growth Rate in the period-IV is determined -0.62% per annum. The production in Rice shows the largest annual growth rate such as 16.65% in the period-I, 3.46% in the period-II, 14.64% in the period-III and 17.43% in the period-IV. A major decline is recorded in the production of Bajra from period-I to period-IV. In the production of Barely there is a decline of growth rate -14.06% per annum in the period-III and -18.35% per annum in the period-IV. Further, after a sharp decline in the production of Mustard from period-I to period-III, a remarkable growth of 30.09% per annum is recorded in the period-IV. In the case of Cotton, the table output shows that Cotton achieved a significant positive growth rate of 21.61% in the period-II, 1.40% in the period-III and 1.34% in the period-IV except a negative growth rate of -8.67% in period-I. The sugarcane also the major commercial crop in Rohtak district which attains positive growth rate in production in period-II and III.

Table 21: Production in Major Crops in Rohtak (in 000 tones)

Crops Years	Cereals					Oilseed	Commercial		Foodgrain
	Wheat	Rice	Jowar	Bajra	Barley		Mustard	Cotton	
2004-05	320	26	7	25	2	30	23	63	392.5
2008-09	448	48	10	37	2	21	16	38.4	558
2012-13	389	55	8	29	11	20	35	54	529.8
2016-17	482	95	8	25	6	13	37	71	636.8
2018-19	476	131	6	18	4	22	38	59	636.8

Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)

Table 22: Compound Annual Growth Rate (CAGR) in Production in Rohtak (in %)

Crops	2004-05 to 2008-09	2008-09 to 2012-13	2012-13 to 2016-17	2016-17 to 2018-19
Wheat	8.78	-3.47	5.51	-0.62
Rice	16.56	3.46	14.64	17.43
Jowar	9.33	-5.43	0.00	-13.40
Bajra	10.30	-5.91	-3.64	-15.15

Barley	0.00	53.14	-14.06	-18.35
Mustard	-8.53	-1.21	-10.21	30.09
Cotton	-8.67	21.61	1.40	1.34
Sugarcane	-11.64	8.90	7.08	-8.84
Foodgrain	9.19	-1.29	4.71	0.00
Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)				

Growth production in Sonipat

Sonipat district was established on 22 December 1972 on the map of Haryana. It has 2122 square kilometer area and occupies 8th position in Haryana on the basis of its size. The population of Sonipat primarily depends on the agriculture sector. In this study, Wheat, Rice, Jowar, Bajra, Maize, Mustard, Cotton, Sugarcane and Potato are taken as the major crops of Sonipat.

The production in total Foodgrain increases from 680.8 thousand tones in the year 2004-05 to 974.2 thousand tones in the 2018-19 while the value of CAGR with 7.54% in period-I and 3.46% in the period-III shows a significant growth in production. Table 23 shows that the Wheat increases with a consistent rate throughout the period of study, that is, 2004 to 2019. But the Table 24 gives a fluctuating production growth in Wheat with 6.98% per annum in the period-I, -1.89% per annum in the period-II, 3.76% per annum in the period-III and -6.82% per annum in the period-IV. Further, the Table 24 shows that among all the crops, Rice has recorded a significant positive growth in all the sub-periods. The CAGR rate of production in Jowar and Bajra decreases continuously from the period-I (2004-05) to period-IV (2018-19). The CAGR of Maize touches a remarkable figure of 49.53% in the period-III and of 13.62% in the period-IV while it gives a sharp decline of -36.75% per annum in the period-IV. The Mustard is the single major Oilseed that attains a significant positive rate of 22.47% per annum in the period-IV after the major decline in the period-I, II, and III. The commercial crops, Cotton and Sugarcane achieved a remarkable positive CAGR value in the period-II, III, and IV except the period-IV. Further, it is analyzed that the potato has a large decline in the growth rate -93.07% per annum in the period-IV.

Table 23: Production in Major Crops in Sonipat (in 000 tones)

Crops Years	Cereals					Oilseed	Commercial			Foodgrain
	Wheat	Rice	Jowar	Bajra	Maize	Mustard	Cotton	Sugarcane	Potato	
2004-05	529	124	4	11	2	6	7	93	10.2	680.8
2008-09	693	186	6	18	0.6	3	0	39.5	18.2	910.4
2012-13	642	216	4	19	3	3	9	62	16.6	897.6
2016-17	744	264	3	12	5	2	11	70	20.8	1028.6
2018-19	646	314	0	10	2	3	15	81	0.1	974.2
Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)										

Table 24: Compound Annual Growth Rate (CAGR) in Production in Sonipat (in %)

Crops	2004-05 to 2008-09	2008-09 to 2012-13	2012-13 to 2016-17	2016-17 to 2018-19
Wheat	6.98	-1.89	3.76	-6.82
Rice	10.67	3.81	5.14	9.06
Jowar	10.67	-9.64	-6.94	-42.26

Bajra	13.10	1.36	-10.85	-8.71
Maize	-25.99	49.53	13.62	-36.75
Mustard	-15.91	0.00	-9.64	22.47
Cotton	-38.52	105.98	5.14	16.77
Sugarcane	-19.27	11.93	3.08	7.57
Potato	15.58	-2.27	5.80	-93.07
Foodgrain	7.54	-0.35	3.46	-2.68
Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)				

Growth production in Panipat

Panipat district was founded on 1st November 1989 on the map of Haryana. It has an area of 1268 square kilometer and has 18th position in the Haryana on the basis of its size. The population of Panipat primarily depends on industries. Wheat, Rice, Mustard, Sugarcane and Potato are some major crops in Panipat district. Table 25 gives the crop wise details of production for the period of 15 years, that is, 2004 to 2018 and Table 26 presents the Compound annual growth rate (CAGR) for the study period-I, II, III, and IV. The results in Table 26 shows the significant positive growth rate of total Foodgrain in the period-I, II, III, and IV. Similarly, Wheat also shows consistent positive growth in production for the period-I (4.21%), period-III (1.49%) and period-IV (1.89%) except for the period-II with a decline of -1.93% per annum. The Rice shows a remarkable growth in the period-I (0.75%), period-II (5.58%) and period-IV (3.72%). In case of Mustard the production as shown in Table 25 is very low in thousand tones but Compound annual growth rate is high in period-IV with CAGR value of 73.21% per annum. During the period-I and period-III the potato has a major decline, but in the period-II and IV a significant positive growth rate of 73.21% per annum and 429.15% per annum is recorded.

Growth production in Karnal

The Karnal district was founded by the famous Raja Karna at the time of Mahabharata and appeared on the map of Haryana as a district on 23rd January, 1973. Geographically, it occupies an area of 2520 square kilometer and has 6th position in Haryana on the basis of its land size. Agriculture is the major occupation of income for the population of Karnal. Rice is the major cereal crop of Karnal and is also known as the rice bowl of India as well as Haryana. Wheat, Bajra, Massar, Mustard, and Potato are also the major crops which are grown in Karnal.

Table 25: Production in Major Crops in Panipat (in 000 tones)

Crops Years	Cereals		Oilseed	Commercial		Foodgrain
	Wheat	Rice	Mustard	Sugarcane	Potato	
2004-05	362	164	1	45	4.9	529.5
2008-09	427	169	2	20.2	0.4	598.5
2012-13	395	210	2	64	3.6	615.2
2016-17	419	198	0	58	0.2	617
2018-19	435	213	3	73	5.6	650.8
Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)						

Table 26: Compound Annual Growth Rate (CAGR) in Production in Panipat (in %)

Crops	2004-05 to 2008-09	2008-09 to 2012-13	2012-13 to 2016-17	2016-17 to 2018-19
Wheat	4.21	-1.93	1.49	1.89
Rice	0.75	5.58	-1.46	3.72
Mustard	18.92	0.00	-15.91	73.21

Sugarcane	-18.15	33.42	-2.43	12.19
Potato	-46.55	73.21	-51.45	429.15
Foodgrain	3.11	0.69	0.07	2.70
Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)				

Table 27 shows that the production in Foodgrain which was 1285 thousand tones in the session 2004-05 has increased to 1593.4 thousand tones in the session 2018-19 and also the Table 28 shows that the Compound Annual Growth Rate also increases continuously from period-I (-0.37%) to the period-IV (4.58%). The production in Wheat which was 715 thousand tones in the year 2004-05 has also increased to 1007 thousand tones in the year 2018-19 and the results in Table 28 shows that the Compound Annual Growth Rate in production continuously increase from the period-I (2.56%) to the period-IV (5.95%) per annum. Table shows that the Rice grows consistently from the year 2004 to 2019 with slight fluctuation in Compound Annual Growth Rate of -4.84% in the period-I, 5.32% in the period-II, -0.75% in the period-III and 2.67% in the period-IV. But the cereal Bajra gives a continuous decline from period-I to period-IV. The Massar shows a major production of 44.28% in the period-II but after that a continuous decline of -15.91% in the period-III and -44.53% in the period-IV is recorded. Mustard and Sugarcane shows a positive growth from the period-I to period-IV. The result in table shows that the potato has also achieved a remarkable growth in the period-IV.

Table 27: Production in Major Crops in Karnal (in 000 tones)

Crops Years	Cereals			Pulses	Oilseed	Commercial		Foodgrain
	Wheat	Rice	Bajra	Massar	Mustard	Sugarcane	Potato	
2004-05	715	567	2	0.5	1	74	20.4	1285
2008-09	791	465	9	0.6	2.3	63.8	20.1	1267.6
2012-13	808	572	2	2.6	2	86	21.1	1390
2016-17	897	555	2	1.3	4	112	0	1456.8
2018-19	1007	585	1	0.4	4	112	29.3	1593.4
Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)								

Table 28: Compound Annual Growth Rate (CAGR) in Production in Karnal (in %)

Crops	2004-05 to 2008-09	2008-09 to 2012-13	2012-13 to 2016-17	2016-17 to 2018-19
Wheat	2.56	0.53	2.65	5.95
Rice	-4.84	5.31	-0.75	2.67
Bajra	45.65	-31.34	0.00	-29.29
Massar	4.66	44.28	-15.91	-44.53
Mustard	23.15	-3.43	18.92	0.00
Sugarcane	-3.64	7.75	6.83	0.00
Potato	-0.37	1.22	-53.34	441.29
Foodgrain	-0.34	2.33	1.18	4.58
Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)				

Growth production in Karnal

The Karnal district was established on 1st November 1989 it covers an area of 2317 square kilometer and gets 7th position in Haryana. In 2018-19, a rainfall of 591 mm was detected in the district. Agriculture is the primary occupation of the peoples. The climate is similar to other district of the Haryana state. The major crops of the district are Wheat, Rice, Bajra, Massar Mustard, Sugarcane and Potato.

The production in total Foodgrain increases from 1132.2 thousand tones in the year 2004-05 to 1563 thousand tones in the year 2018-19 as shown in Table 29 and the Compound Annual Growth Rate CAGR is also positive in the period-I, II, III, and IV. The production in Wheat shows a remarkable increase of 1057 thousand tones in the year 2018-19 as compared to the year 2004-05 and also the CAGR of Wheat is also noted significant in the period-I, III, and IV except for the period-II which has a negative growth rate of -0.79% per annum. The Rice production present a positive CAGR in the period-II and III and the negative CAGR in the period-I and IV. The result in Table 30 shows a continuous decline in the production Bajra from 16.21% in the period-I to -42.26% in the period-IV. The production in Massar gives a major growth rate of 49.53% in the period-II but after that a major decline of -39.57% in the period-III and -29.29% in the period-IV is recoded. The Sugarcane shows a consistent positive growth in the period-I, II, III, and IV. The CAGR value of the production in Potato shows a sharp decline in all the periods except for the period-II and the Mustard attains a growth of 41.42% per annum in the period-IV.

Table 29: Production of Major Crops in Kaithal (in 000 tones)

Crops Years	Cereals			Pulse s	Oilseed	Commercial		Foodgrain
	Wheat	Rice	Bajra	Massar	Mustard	Sugarcane	Potato	
2004-05	716	399	17	0.2	1	12	4.7	1132.2
2008-09	832	391	31	0.3	2	14.2	3.8	1254.6
2012-13	806	512	13	1.5	2	34	8.9	1332.5
2016-17	861	552	6	0.2	1	38	0	1425.4
2018-19	1057	504	2	0.1	2	47	0.4	1563

Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)

Table 30: Compound Annual Growth Rate (CAGR) in Production in Kaithal (in %)

Crops	2004-05 to 2008-09	2008-09 to 2012-13	2012-13 to 2016-17	2016-17 to 2018-19
Wheat	3.83	-0.79	1.66	10.80
Rice	-0.51	6.97	1.90	-4.45
Bajra	16.21	-19.53	-17.58	-42.26
Masoor	10.67	49.53	-39.57	-29.29
Mustard	18.92	0.00	-15.91	41.42
Sugarcane	4.30	24.39	2.82	11.21
Potato	-5.18	23.71	-42.10	-36.75

Foodgrain	2.60	1.52	1.70	4.72
Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)				

Growth production in Kurukshetra

The Kurukshetra is the place which is also called Dharamkashetra or the land of Kaurvas. The War of Mahabharata was fought in the Kurukshetra and Lord Krishna addressed Bhagwad Gita in Mahabharata War. The Kurukshetra was established in 1973 it covers an area of 1530 square kilometer and gets 15th position in Haryana. In 2018-19, a rainfall of 692.6 mm was detected in the district. Agriculture is the primary occupation of the peoples. The climate is similar to other district of the Haryana state. The major crops of the district are Wheat, Rice, Massar, Mustard, Sugarcane and Potato.

Table 31 give the production of crops and Table 32 shows the Compound Annual Growth Rate CAGR in the production of major crops. The production in total Foodgrain is consistent from the year 2004-05 to 2018-19 followed by Wheat, Rice and Massar. Therefore, the CAGR of total Foodgrain in production is positive with 2.57% per annum in the period-II and 0.39% per annum in the period-III and is negative with a small decline of -0.50% in the period-I and -2.33% in the period-IV. The Wheat also give a significant growth in production in the period-I, II and III except for the period-IV. Massar shows a major decline of -24.02% in the period-III and -68.38% in the period-IV. The results in Table 32 shows the largest increase in the production of Mustard with CAGR value 110.22% per annum in the period-IV. The growth production in Sugarcane is continuously increases from -6.75% per annum in the period-I to 6.20% per annum in the period-IV. The Potato is the major agricultural commercial crops in Kurukshetra. Therefore, a remarkable growth of 110.22% per annum in the period-IV is recorded in the production. The Rice give a steady state behavior in production and also in the CAGR value throughout the period of 15 years, that is, from the year 2004-05 to 2018-19.

Table 31: Production of Major Crops in Kurukshetra (in 000 tones)

Crops Years	Cereals		Pulses	Oilseed	Commercial		Foodgrain
	Wheat	Rice	Massar	Mustard	Sugarcane	Potato	
2004-05	463	468	0.5	1	91	126.8	931.6
2008-09	504	408	0.3	2.2	68.8	157	913
2012-13	526	477	3	3.2	75	160.4	1010.6
2016-17	521	495	1	3.1	86	10	1026.3
2018-19	559	416	0.1	13.7	97	283.7	979.1
Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)							

Table 32: Compound Annual Growth Rate (CAGR) in Production in Kurukshetra (in %)

Crops	2004-05 to 2008-09	2008-09 to 2012-13	2012-13 to 2016-17	2016-17 to 2018-19
Wheat	2.14	1.07	-0.24	3.58
Rice	-3.37	3.98	0.93	-8.33
Masoor	-11.99	77.83	-24.02	-68.38
Mustard	21.79	9.82	-0.79	110.22
Sugarcane	-6.75	2.18	3.48	6.20
Potato	5.49	0.54	-50.03	432.63
Foodgrain	-0.50	2.57	0.39	-2.33
Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)				

Growth production in Yamunanagar

Yamunanagar district was established on 1st November 1989 it covers an area of 1768 square kilometer and gets 11th position in Haryana. In the year 2018-19, a large rainfall of 1095.3 mm was detected in the district. Agriculture is the primary source of the income for the population. The climate is similar to other district of the Haryana state. Wheat, Rice, Maize, Mash, Massar, Mustard, Sugarcane and Potato are the major crops of the district.

Table 33 shows that the production in total Foodgrain increase rapidly from 444.7 thousand tones in the year 2004-05 to 664.2 thousand tones in the year 2018-19. Also, the Table 34 shows that the Compound annual growth rate is positive and significant in the period-I, II, and III while the period-IV give a minor decline of -2.64% per annum. Similarly, Wheat and Rice gives a positive and remarkable growth in the period-I, II, and III except for the period-IV. A major negative decline in the production of the Maize is recorded from period-I to IV, that is, -13.49% in the period-I, -8.07% in the period-II, -15.91% in the period-III and -68.38% in the period-IV. After a major increase of 83.48% per annum in the period-II in the growth production of Mash, a sharp decline of -21.36% in the period-III and -72.26% in the period-IV is recorded. Similarly, Massar and Sugarcane also gives a continuous decline from period-I to period-IV. The production in Mustard increases from 2 thousand tones in the year 2004-05 to 7.2 thousand tones in the year 2018-19. Therefore, the Compound Annual Growth Rate CAGR remains positive and significant in the period-I, II, and IV except for the period-IV. The Potato gives a fluctuating growth and shows an increase of 22.47% per annum in the period-IV.

Table 33: Production in Major Crops in Yamunanagar (in 000 tones)

Crops Years	Cereals			Pulses		Oilseed	Commercial		Foodgrain
	Wheat	Rice	Maize	Mash	Massar	Mustard	Sugarcane	Potato	
2004-05	245	191	5	0.3	1.4	2	260	27.2	444.7
2008-09	345	221	2.8	0.3	0.8	4	148.4	15	571.9
2012-13	369	277	2	3.4	7.2	4.2	199	21	661.7
2016-17	399	295	0	1.3	3.3	2	183	14.6	700.7
2018-19	390	274	0.1	0.1	0.1	7.2	168	21.9	664.2

Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)

Table 34: Compound Annual Growth Rate (CAGR) in Production in Yamunanagar (in %)

Crops	2004-05 to 2008-09	2008-09 to 2012-13	2012-13 to 2016-17	2016-17 to 2018-19
Wheat	8.93	1.70	1.97	-1.13
Rice	3.71	5.81	1.59	-3.63
Maize	-13.49	-8.07	-15.91	-68.38
Mash	0.00	83.48	-21.36	-72.26
Massar	-13.06	73.21	-17.72	-82.59
Mustard	18.92	1.23	-16.93	89.74
Sugarcane	-13.08	7.61	-2.07	-4.19

Potato	-13.83	8.78	-8.69	22.47
Foodgrain	6.49	3.71	1.44	-2.64
Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)				

Growth production in Ambala

The Ambala district occupies 1574 square kilometer area and has the 14th position on the basis of size in Haryana state. Economically, the income of the population basically depends on the agriculture sector. The major crops in Ambala district are Wheat, Rice, Mash, Massar, Mustard, Sugarcane and Potato. The growth rate in production is determined using Compound annual growth rate (CAGR) method. Table 35 gives the production in thousand tones and Table 36 shows the CAGR (in percentage) in production of major crops.

Therefore, it is clear from the Table 35 that the total Foodgrain in Ambala is likely to increase from 508.5 thousand tones in the year 2004-05 to 695.1 thousand tones in the year 2018-19 showing an increase of 36.69 percent. While the CAGR of Foodgrain in the period-I (3.45%) and period-II (5.43%) shows a positive and significant growth except for the period-III and IV as shown in Table 37. Similarly, the production in Wheat gives a continues increase from 267 thousand tones in the year 2004-05 to 416 thousand tones in the year 2018-19. The CAGR value of wheat in production is recorded positive and remarkable in the period-I, II, III and IV. The production in Rice is examined satisfactory as it increases from 233 thousand tones in the year 2004-05 to 319 thousand tones in the year 2016-17 while a major decline is recorded in the year 2018-19 as shown in Table 35. Therefore, the CAGR value in the period-I and II gives positive and significant growth while in the period-III and IV it shows decline in the CAGR value. In the case of Mash Compound Annual Growth Rate is determined positive in the period-I, II, and III and a major decline of -60.47% is examined in the period-IV. The growth production of Massar is not satisfactory as it gives negative Compound Annual Growth Rate in the period-I, III, and IV except for the period-II. The results in Table 36 shows that the Mustard gives the largest growth of 116.79% per annum in the period-IV. Sugarcane shows an alternative behavior of growth from the period-I to period-IV and Potato gives a major significant growth in production throughout the given period.

Table 35: Production of Major Crops in Ambala (in 000 tones)

Crops Years	Cereals		Pulses			Oilseed	Commerci al	Foodg rain
	Whe at	Rice	Mas h	Mass ar	Mustar d	Sugarcan e	Potato	
2004-05	267	233	0.2	1.2	2	82	54.5	508.5
2008-09	309	267	0.3	0.6	1	61.6	23	582.5
2012-13	366	343	2.3	5.1	2.5	79	43.7	719.7
2016-17	392	319	3.2	3.6	1	78	48.4	718.8
2018-19	416	46	0.5	0.2	24.7	83	74	695.1
Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)								

Table 36: Compound Annual Growth Rate(CAGR) in Production in Ambala (in %)

Crops	2004-05 to 2008-09	2008-09 to 2012-13	2012-13 to 2016-17	2016-17 to 2018-19
Wheat	3.72	4.32	1.73	3.02
Rice	3.46	6.46	-1.80	-62.03
Mash	10.67	66.40	8.61	-60.47
Masoor	-15.91	70.75	-8.34	-76.43
Mustard	-15.91	25.74	-20.47	116.79
Sugarcane	-6.90	6.42	-0.32	3.16
Potato	-19.40	17.41	2.59	23.65
Foodgrain	3.45	5.43	-0.03	-1.66

Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)

Growth production in Panchkula

The Panchkula district occupies an area of 898 square kilometer and has 20th position in the Haryana state on the basis of size. It is a planned satellite city of Haryana established in the Chandigarh region. It is surrounded by five Canals. The agricultural production is the major source of income for the population in Panchkula. Wheat, Rice, Maize, Mustard, Sugarcane, and Potato, are the major crops of this region.

This section deals with the production and Compound Annual GrowthRate (CAGR) of major crops as given in Table 37 and Table 38. In the period of 15 years from 2004-05 to 2018-19 the total Foodgrain production increases from 72.7 thousand tones in the year 2004-05 to 130.2 thousand tones in the year 2016-17 but a major decline is noticed in the year 2018-19. Also, the growth rate CAGR in production of total Foodgrain shows a positive annual growth in the period-I, II and III, that is, 1.38% in the period-I, 10.23% in the period-II and 1.47% in the period-III except for the period-IV with a decline of -15.17%. Similarly, the growth in Wheat production is likely to decrease in the period-IV with -23.71% per annum. The production in Rice is significant and positive in the period-I and II while a major decline is recorded in the period-III and IV. After a major decline in the period-I, II and III the Mustard give a remarkable growth of 123.61% per annum in the period-IV. The production pattern of Sugarcane and Potato is not so good. Overall growth in the production of Sugarcane is negative except for the period-IV and the Potato give an alternative growth pattern.

Table 37: Production in Major Crops in Panchkula (in 000 tones)

Crops Years	Cereals			Oilseed	Commercial		Foodgrain
	Wheat	Rice	Maize	Mustard	Sugarcane	Potato	
2004-05	32	17	21	1.9	6	6.2	72.7
2008-09	38	23	13	5	0	15.9	76.8
2012-13	59	38	14	2	0.2	4	113.4
2016-17	67	37	14	0.2	8	8	120.2
2018-19	39	18	25	1	6	5.4	86.5

Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)

Table 38: Compound Annual Growth Rate (CAGR) in Production in Panchkula (in %)

Crops	2004-05 to 2008-09	2008-09 to 2012-13	2012-13 to 2016-17	2016-17 to 2018-19
Wheat	4.39	11.63	3.23	-23.71

Rice	7.85	13.37	-0.66	-30.25
Maize	-11.30	1.87	0.00	33.63
Mustard	27.37	-20.47	-43.77	123.61
Sugarcane	-36.11	-33.13	151.49	-13.40
Potato	26.55	-29.18	18.92	-17.84
Foodgrain	1.38	10.23	1.47	-15.17
Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)				

Growth production in Mewat/Nuh

Mewat district was established on 4th April 2005 on the map of Haryana. It occupies 1507 square kilometer area and gets 16th position in Haryana on the basis of size. The climate remains extremely hot in summer season and very cold in winter season. The agriculture as well as milk production is the major source of income of the population of Mewat. Wheat, Rice, Jowar, Bajra, Barley, Massar, and Mustard are among the major crops. Table 39 gives the production of major crops in thousand tones and the Table 40 presents the Compound Annual Growth Rate of major crops in production in percentage. Table 39 shows that the total Foodgrain increases from 340.5 thousand tones in the year 2005-06 to 453.5 thousand tones in the year 2018-19. Also, the Compound annual growth rate of Foodgrain shows a remarkable growth of 2.68% in the period-II, 3.91% in the period-III, and 2.71% in the period-IV and a sharp decline in recorded in the period-I of -0.86% per annum. Similarly, the production in wheat increases from 276 thousand tones in the year 2005-06 to 347 thousand tones in the year 2018-19 and the value of CAGR in the period-II, III, and IV shows a significant positive growth rate. The growth production in Rice shows a sharp decline in period-I, II, and IV except period-III which has an increase of 26.22% per annum. In case of Jowar there is an alternative growth from period-I to period-IV. It gives a positive CAGR value 18.56% in the period-I and 22.47% in the period-III and a negative growth rate of -5.43% in the period-II and -25.46% in the period-IV. The production in Bajra give a continuous, positive and significant growth from period-I to period-IV as shown in Table 39 and 40. In the case of Barely and Mustard a remarkable growth is recorded in period-IV. The Massar is not performing satisfactory behavior as it gives a negative growth rate in the period-I, III and IV except in period-II.

Table 39: Production in Major Crops in Mewat (in 000 tones)

Crops Years	Cereals					Pulses	Oilseed	Foodgrain
	Wheat	Rice	Jowar	Bajra	Barley	Massar	Mustard	
2005-06	276	27	3	26	6	0.5	43	340.5
2008-09	271	16	5	35	3	0.4	48	331.8
2012-13	296	13	4	43	3	3.5	46	368.8
2016-17	338	33	9	49	0	1.9	40	429.9
2018-19	347	31	5	68	2	0.2	59.9	453.5
Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)								

Table 40: Compound Annual Growth Rate (CAGR) in Production in Mewat (in %)

Crops	2005-06 to 2008-09	2008-09 to 2012-13	2012-13 to 2016-17	2016-17 to 2018-19
Wheat	-0.61	2.23	3.37	1.32

Rice	-16.01	-5.06	26.22	-3.08
Jowar	18.56	-5.43	22.47	-25.46
Bajra	10.42	5.28	3.32	17.80
Barley	-20.63	0.00	-24.02	41.42
Masoor	-7.17	71.99	-14.16	-27.45
Mustard	3.73	-1.06	-3.43	22.37
Foodgrain	-0.86	2.68	3.91	2.71
Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)				

Growth production in Palwal

The district Palwal was established in 2008 and covers an area of 1359 square kilometer and is on 17th position in Haryana on the basis of size. Wheat, Rice, Jowar, Bajra, Barley, Mustard, and Sugarcane are the major crops in Palwal. Table 41 gives the production of major crops in thousand tones and the Table 42 shows the CAGR of major crops in production in percentage.

From the Table 41 it is recorded that there is a decline in the production of total Foodgrain from 563.9% in the year 2008-09 to 526.6% in the year 2018-19 and the Table 42 also give a minor decline in the annual growth rate of -0.36% in the period-I, -0.72% in the period-II and -1.26% in the period-III. Similarly, the production in Wheat is also not satisfactory and shows a continuous decline from -1.31% in the period to -2.63% in the period-III. In case of Rice the production achieved a remarkable CAGR growth rate of 2.91% in the period-I, 3.43% in the period-II and 1.57% in the period-III. In Table 41 the production in Jowar is looking consistent and Bajra shows a remarkable growth of 31.43% in the period-IV as shown in the Table 42. Also, from the Table 41 and 42 it is clear that the production in Barely is stable throughout the period. Further, Mustard and Sugarcane shows a major decline in the period-I and period-II but after that they shows positive and significant growth in the period-IV.

Table 41: Production in Major Crops in Palwal (in 000 tones)

Crops Years	Cereals					Oilseed	Commercial	Foodgrain
	Wheat	Rice	Jowar	Bajra	Barley	Mustard	Sugarcane	
2008-09	466	74	4	15	3	8	21.5	563.9
2012-13	442	83	3	15	3	7	15	555.9
2016-17	424	95	4	11	3	3	10	540.1
2018-19	402	98	3	19	3	6	12	526.6
Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)								

Table 42: Compound Annual Growth Rate (CAGR) in Production in Palwal (in %)

Crops	2008-09 to 2012-13	2012-13 to 2016-17	2016-17 to 2018-19
Wheat	-1.31	-1.03	-2.63
Rice	2.91	3.43	1.57
Jowar	-6.94	7.46	-13.40
Bajra	0.00	-7.46	31.43

Barley	0.00	0.00	0.00
Mustard	-3.28	-19.09	41.42
Sugarcane	-8.61	-9.64	9.54
Foodgrain	-0.36	-0.72	-1.26
Data Source: Statistical Abstract of Haryana (Different issues from 2004-05 to 2018-19)			

CONCLUSION

Throughout, the paper it is examined that the growth in production is very necessary for the self-dependency on food and the success of the agriculture sector for any state. The few crops like Wheat, Rice, Cotton, and Mustard shows the major significant and positive Compound Annual Growth Rate in production. But the remaining cereals, pulses, oilseed and commercial crops are showing a major decline in the production. Therefore, the policies introduced by the Government must be used to improve the production of all the crops.

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