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TRENDS IN AREA, PRODUCTION AND PRODUCTIVITY OF GROUNDNUT CROP IN JHANSI DISTRICT OF UTTAR PRADESH AND INDIA

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ABSTRACT

This study was conducted to comparatively analysis for area, production and productivity of groundnut in India, Uttar Pradesh and Jhansi district. In this study, a comparative analysis has been done for area, production and productivity of groundnut crop at national state and Jhansi district level during 2004-05 to 2016-17. This study calculates comparative analysis of groundnut production in Jhansi district of U.P. during 2004-05 to 2016-17. Area, production and productivity of groundnut crop at national, state and Jhansi district level from 2004-05 to 2016-2017 was recorded and presented graphically. In India, during 2004-05 to 2016-17, the compound annual growth rate in groundnut area can be seen to be negative at -2.65 while the positive CAGR in production and productivity 0.53 and 3.25 respectively due to greater use of high yield varieties. Positive compound annual growth rate has been recorded in area production and productivity in groundnut sector in Uttar Pradesh and Jhansi due to shifting cropping pattern and adopting oilseeds cultivation. The coefficient of variation indicates high area volatility in India with 12.61 per cent, while Uttar Pradesh is 8.13 per cent. Similarly, when the Cuddi-Della Valle instability Index is applied, Uttar Pradesh is found to have high volatility, followed by 8.49 per cent across India. with 7.27 per cent. According to recorded data, some interpretations have been drawn regarding the improvement in the production of groundnut crop.

Keywords : Area, Groundnut, Production, Productivity.

Introduction

India is one of the world's largest producers of oilseeds and agriculture plays an important role in the Indian economy. In India, some oilseeds crops are groundnut, rapeseed-mustard, soybean, sunflower, safflower, sesame, castor and linseed. While Groundnut is known as 'King' of oilseeds. In India, groundnut is also considered as food and cash crops Whereas in spite of having all nutrients in groundnut, it is a very low Price of food crops. Apart from being the cashew nut of the poor, it is also known as a unique nut. Groundnut is an important oilseed crop in India but in context of export item, it is also very important oilseeds crops.

India is the second largest producing country of groundnut in the world with India (102.44 lakh

tonnes), in 2021-22, with China 183.08 lakh tonnes Nigeria (46.08 lakh tonnes) United States of America (28.98 lakh tonnes), and Sudan (23.55 lakh tonnes). In India, approximately 19 % contribution in whole world groundnut production compare with China (34 %) Nigeria (9 %) USA (6%) and Sudan (4%) during 2021-22. Groundnut production in the world, India secured second rank approximately contributed by 19% next to China (34%) Nigeria secured third rank with (9 %) USA on place fourth with (6%) and Sudan stands fifth with (4%) during 2021-22.

Groundnut coverage area in India was 6.10 million ha, production 10.24 million tonnes and productivity 1703 kg/ha in 2020-21. The six major groundnut producing states, covering about 87.38% of the national area under groundnut cultivation, include

Gujarat (2.16 million ha 35.96%), Andhra Pradesh (0.87 million ha 14.46%), Rajasthan (0.86 million ha 14.23%), Karnataka (0.72 million ha. 11.99%), Tamil Nadu (0.41 million ha. 6.80%), Maharashtra (0.31 million ha. 5.14%) In India, groundnut area was increased in 2020-21 by 1.1% compare to 2019-20. During 2020-21 maximum area of groundnut crop increase was recorded in Karnataka (44%) Andhra Pradesh (31.81%) Gujrat (27.81%) Tamilnadu (17.14%) compare to 2019-20. *Indiastate.com*

Objective

1. To compute the trend of area, production and productivity of groundnut cultivation in India.
2. To compute the trend of area, production and productivity of groundnut cultivation in Jhansi, district of Uttar Pradesh.
3. To examine the crop instability of groundnut cultivation at India, Uttar Pradesh and Jhansi district level.

Materials and Method

This study is completely dependent on secondary data. In this study, secondary data of area, production and productivity in Groundnut cultivation from 2004-05 to 2016-17 was collected from Directorate of Economics and Statistics "Agricultural statistical at a glance" (2004-2017), Ministry of agricultural and farmers welfares and other published sources. In this study, an attempt has been made to achieve the targeted objectives by collecting data and using various tools and techniques according to time periods.

Coefficient of variation (CV), is the simplest method for calculating instability of crop in which overestimates the degree of instability in time series data as given by long-term trends.

$$\text{Coefficient of Variation (CV)} = \frac{\text{Standard Deviation}}{\text{Mean}} \times 100$$

Cuddy-Della Valle Index (CDVI) The Cuddy-Della Valle Index reverse annually trend and clearly shows the direction of change (Cuddy and Della, 1978). As a result, this is a super method to measure the instability of area, production and productivity. Smaller values of this index represent lower price volatility, and vice versa. Cuddy-Della Valle index as follows:

$$\text{Cuddy-Della Valle Instability Index (\%)} = CV \sqrt{(1 - R^2)}$$

Where, CV = coefficient of Variation (%)

R^2 = adjusted coefficient of determination

Compound annually growth rates for the area, production, and yield of groundnut was calculated by fitting time-series data to the following mathematical function.

$$Y = ab^t$$

Where,

Y=Index number of areas, production, productivity considered as the dependent variable.

t = Year considered as independent variable.

a = Intercept

b = Regression coefficient

This Equation can be described in logarithmic form are as follows:

$$\text{Log } y = \text{log } a + t \text{ log } b$$

$$\text{Log } y = A + B t$$

Where, A = log a; B = log b

The compound growth rate "r" was computed as.
 $r = (\text{Antilog of } b - 1) \times 10$.

Result and Discussion

Groundnut is known as cash crops in India. Groundnut is the economical price of commodity despite an important source of all nutrients. Groundnut are the world's sixth important oilseed crop in which contains 48-50% fat and 26-28% protein and is rich in dietary fiber, minerals and vitamins. Groundnut oil can be uses in many things. but generally used as cooking oil. It is also used for making soaps, fuels, cosmetics, shaving creams, leather dressings, furniture creams, lubricants, etc. Groundnut oil is used for making vanaspati ghee and fatty acids. Groundnut oil is used for making food items like butter, milk, candy and chocolate variety of medicated ointments, plasters, syrups and medicated emulsions, chutney, peanut pack, laddoos, barfi (chuki) etc. It is also used for preserving pickles, chutneys etc. Groundnut are an important protein sources for livestock and poultry. It is also consumed as a food product. The cake can be used to manufacture synthetic fibers. Groundnut shells are used as fuel for the manufacture of thick boards, a cork substitute. Groundnut has nodular buds in its roots, which increases the fertility of the soil by absorbing nitrogen from the atmosphere, so this crop also has an important contribution in the crop cycle.

Area, Production and Productivity of Groundnut in India

In India, during 2005–2006, the area under groundnut cultivation was 6.64 million hectares and

the production was 6.77 million tonnes, with a productivity of 1020 kg per hectare. however, the cropped area under groundnut has observed continuously decline from 6.74 million ha in 2005–06. This area was converted 5.34 million hectares in 2016–17. The main reasons for the decline in groundnut acreage have been attributed to the change in cropping pattern and less rainfall in the southern states during

the past years. During the decade from 2004-05 to 2016-17, there was a fluctuation in the production of groundnut in India. Due to scanty and irregular rainfall, the area and production of groundnut was decreased during 2012-13. The annual average area, production and productivity of groundnut during the period 2004-05 to 2016-17 was 5.61 million hectares, production 7.12 million tonnes and 1276.46 per hectare.

Table 1 : Area, Production and Productivity of Groundnut Crop in India during 2004-05 to 2016-17.

Year	Area (in Million hectares)	Production (in Million tons)	Productivity (kg/ha.)
2004-05	6.64	6.77	1020
2005-06	6.74	7.99	1187
2006-07	5.62	4.86	866
2007-08	6.29	9.18	1459
2008-09	6.16	7.17	1163
2009-10	5.48	5.43	991
2010-11	5.86	8.26	1411
2011-12	5.26	6.96	1323
2012-13	4.72	4.70	995
2013-14	5.51	9.71	1764
2014-15	4.71	7.40	1552
2015-16	4.60	6.73	1465
2016-17	5.34	7.46	1398
Annual Average	5.61	7.12	1276.46

Source- Directorate of Economic and statistics New Delhi

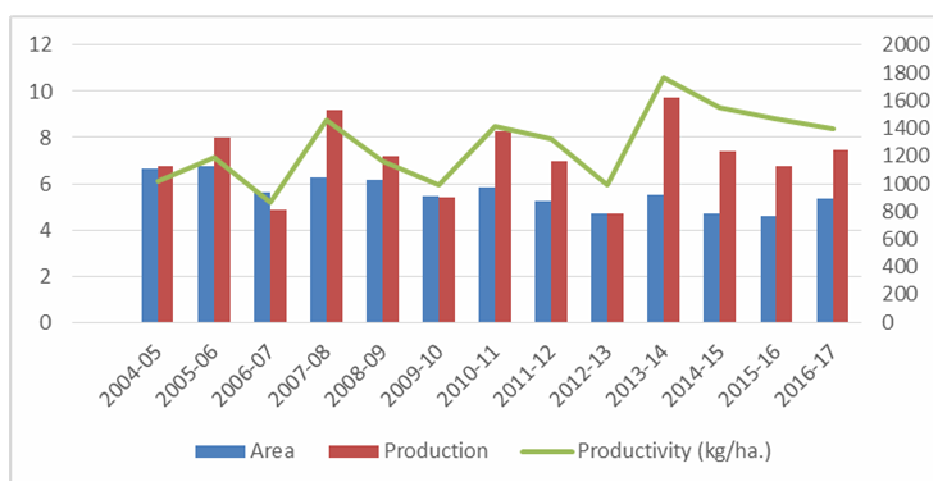


Fig. 1: Area, Production & productivity of Groundnut Crop in India (2004-05 to 2016-17)

Area, Production & productivity of Groundnut in Major Growing States in India during (2017-18).

The state-wise area production and productivity of groundnut is presented in Table 2. This table shows, Gujarat, Andhra Pradesh, Rajasthan and Karnataka states are stands top four positions in cultivated area. Gujarat topped the list with 1.68 million hectares, followed by Andhra Pradesh with 0.74 million hectares, Rajasthan with 0.64 million hectares and Karnataka with 0.62 million hectares. But when the

production was seen, there was a slight change in the order. Gujarat tops the total production with 42.48 per cent, followed by Andhra Pradesh 11.33 per cent, Rajasthan 13.73 per cent and Karnataka 6.10 per cent. However, other states like Tamil Nadu, Maharashtra, Madhya Pradesh, Telangana and West Bengal are also groundnut producing states.

Per hectare production was high in Tamilnadu state with 2914 kg/ha but its rank was fourth in total groundnut production during 2017-18. The per hectare

yield is low in major groundnut producing states like low with (908 kg/ha) as compared to other states. Andhra Pradesh. Productivity of Karnataka was very

Table 2: Major states of India in groundnut cultivation

S. No.	State	Area (in million hectares)	Production (million tons)	Productivity (kg/ha.)
1	Gujrat	1.68	3.94	2343
2	Andhra Pradesh	0.74	1.04	1416
3	Rajsthan	0.64	1.26	1966
4	Karnataka	0.62	0.56	908
5	Tamilnadu	0.33	0.97	2914
6	Maharashtra	0.26	0.33	1255
7	Madhya Pradesh	0.22	0.35	1558
8	Telangana	0.17	0.35	2114
9	West Bengal	0.07	0.17	2343
	India	4.91	9.18	1868

Source- Directorate of Economic and statistics New Delhi

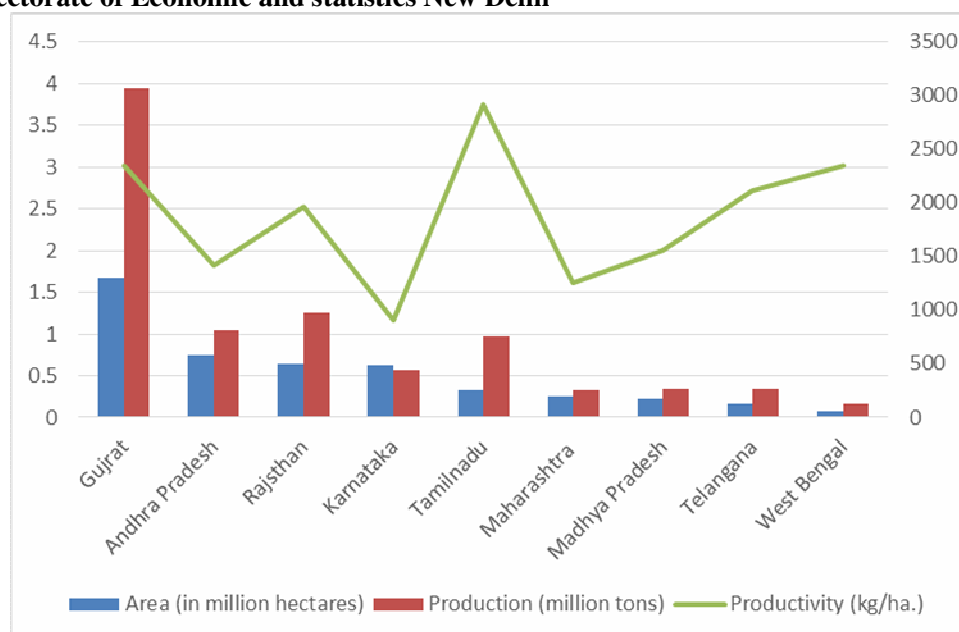


Fig. 2 : Area, Production & productivity of Groundnut in Major Growing States in India during (2017-18).

Area, Production and Productivity of Groundnut in Uttar Pradesh

The area, production and productivity of groundnut crop in Uttar Pradesh during 2004-05 to 2016-17 is presented in Table 3. The area under

groundnut crop in Uttar Pradesh fluctuated between 0.08 million hectares in 2004–2005 and 0.09 million hectares in 2016-17. It has been observed that the area under groundnut has increased in Uttar Pradesh.

Table 3: Area, Production and productivity of Groundnut Crop in Uttar Pradesh during 2004-05 to 2016-17

Year	Area (in million hectares)	Production (in million tons)	Productivity (Kg. /ha.)
2004-05	0.08	0.07	816
2005-06	0.11	0.09	851
2006-07	0.10	0.07	730
2007-08	0.10	0.06	598

2008-09	0.10	0.07	705
2009-10	0.09	0.06	670
2010-11	0.09	0.08	988
2011-12	0.09	0.09	1000
2012-13	0.09	0.09	1000
2013-14	0.10	0.09	896
2014-15	0.10	0.08	857
2015-16	0.10	0.07	670
2016-17	0.09	0.09	904

Source : Directorate of Economic and statistics New Delhi

It was observed in this study that there were year-to-year fluctuations in the crop production of groundnut during the last decade. The production was 0.07 million tonnes in 2004-05 and 0.09 million tonnes in 2016-17. It has been observed that the production of groundnut has also increased with the area in Uttar Pradesh. The productivity of groundnut is also fluctuated from 2004-05 to 2016-17. The per hectare

production of groundnut was 816 q/ha. in 2004-05 and the highest production per hectare was observed in 2011-12 and 2012-13. It is observed that in Uttar Pradesh the total production increased from 2011 to 2014 but the per hectare production of groundnut declined in the years 2009-10 and 2015-16. This could be due to lack of proper monsoon during these two years.

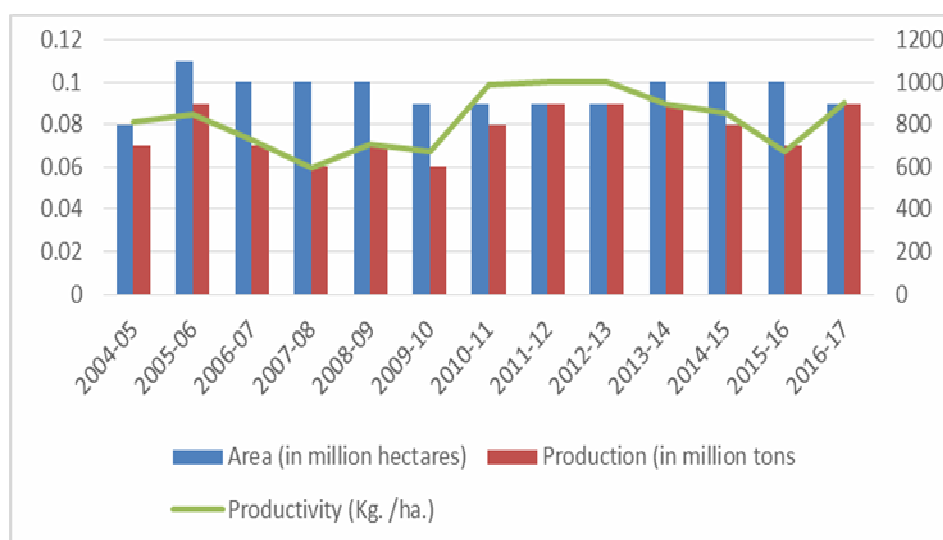


Fig. 3 : Area, Production & productivity of groundnut crop in Uttar Pradesh during 2004-05 to 2016-17 is graphically presented.

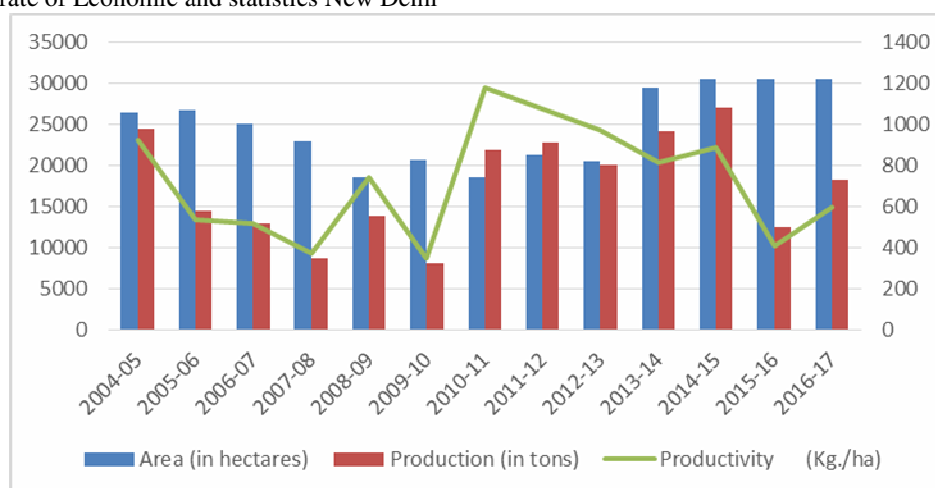
From the data recorded in Table 4, it is observed that there is no change in the area under groundnut in Jhansi district from 2014-15 to 2016-17 whereas the production and productivity has decreased during these years. However, the area under groundnut was 26480 hectares in 2004-05, which increased to 30549 hectares in 2016-17, thus showing an increase of 15.37 percent. It can be seen from Table 4 that Jhansi district is showing increasing trend in area under groundnut from 2012-13 to 2016-17. Accordingly, the production has

declined from 24573 tonnes in 2004-05 to 18352 tonnes in 2016-17, showing a decrease of 25.31 per cent. Highest productivity 1183 kg/ha was recorded in 2010-11 and lowest productivity 350 kg./ha. was recorded in 2009-10. Based on the data from 2004-05 to 2016-17, it can be said that the productivity which was 928 kg/ha in 2004-05 but in 2016-17 the productivity decreased by 35.23 percent to reach 601 kg/ha.

Table 4 : Area, Production and Productivity of Groundnut Crop in Jhansi District during 2004-05 to 2016-17.

Year	Area (in hectares)	Production (in tons)	Productivity (Kg./ha)
2004-05	26480	24573	928
2005-06	26757	14462	540
2006-07	25080	13017	519
2007-08	23010	8698	378
2008-09	18634	13920	747
2009-10	20811	8220	350
2010-11	18620	22020	1183
2011-12	21303	22922	1076
2012-13	20662	20104	975
2013-14	29491	24153	819
2014-15	30549	27158	889
2015-16	30549	12521	410
2016-17	30549	18352	601

Source : Directorate of Economic and statistics New Delhi

**Fig. 4:** Area, Production and Productivity of Groundnut Crop in Jhansi District during 2004-05 to 2016-17.

Area, Production and Productivity of Groundnut at National Level, State Level & District Level.

The comparative analysis of area, production and productivity of groundnut crop at national level, state level and district level during 2004-05 to 2016-17 is

presented in Table 5. The area under groundnut production in India was 6.64 million hectares during 2004-05. During the same year, the area under groundnut was 0.08 million hectares in Uttar Pradesh and 26480 hectares in Jhansi district of Uttar Pradesh.

Table 5 : Area, Production and productivity at National, State & District Level during 2004-05 to 2016-17.

Year		India	Growth rate	Uttar Pradesh	Growth rate	Jhansi District	Growth rate
2004-05	Area	6.64	10.85	0.08	0	26480	28.38
	Production	6.77	-16.72	0.07	-16.67	24573	85.66
	Productivity	1020	-24.83	816	-50.57	928	51.63
2005-06	Area	6.74	1.50	0.11	37.5	26757	1.04
	Production	7.99	18.20	0.09	28.57	14462	-41.14
	Productivity	1187	16.37	851	4.28	540	-41.81
	Area	5.62	-16.61	0.10	9.09	25080	-6.26

2006-07	Production	4.86	-39.17	0.07	-36.36	13017	-9.99
	Productivity	866	-37.06	730	-14.21	519	-3.88
2007-08	Area	6.29	11.92	0.10	0	23010	-8.25
	Production	9.18	88.88	0.06	-14.28	8698	-33.17
	Productivity	1459	68.47	598	-18.08	378	-27.16
2008-09	Area	6.16	-2.06	0.10	0	18634	-19.01
	Production	7.17	-21.89	0.07	16.67	13920	60.03
	Productivity	1163	-20.28	705	17.89	747	97.61
2009-10	Area	5.48	-12.40	0.09	-10	20811	11.68
	Production	5.43	-24.26	0.06	-14.28	8220	-40.94
	Productivity	991	-14.78	670	-4.96	350	-53.14
2010-11	Area	5.86	6.93	0.09	0	18620	-10.52
	Production	8.26	52.11	0.08	33.33	22020	167.88
	Productivity	1411	42.38	988	47.46	1183	238.00
2011-12	Area	5.26	-10.23	0.09	0	21303	14.40
	Production	6.96	-15.73	0.09	12.5	22922	4.09
	Productivity	1323	-6.23	1000	1.21	1076	-9.04
2012-13	Area	4.72	-10.26	0.09	0	20662	-3.00
	Production	4.70	-32.47	0.09	0	20104	-12.29
	Productivity	995	-24.79	1000	0	975	-9.38
2013-14	Area	5.51	16.73	0.10	11.11	29491	42.73
	Production	9.71	106.59	0.09	0	24153	20.14
	Productivity	1764	77.28	896	-10.4	819	-16.00
2014-15	Area	4.71	-14.51	0.10	0	30549	3.58
	Production	7.40	-23.78	0.08	-11.11	27158	12.44
	Productivity	1552	-12.01	857	-4.35	889	8.54
2015-16	Area	4.60	-2.33	0.10	0	30549	0
	Production	6.73	-9.05	0.07	-12.5	12521	-53.89
	Productivity	1465	-6.01	670	-21.82	410	-53.88
2016-17	Area	5.34	16.08	0.09	-10	30549	0
	Production	7.46	10.84	0.09	28.57	18352	46.56
	Productivity	1398	-4.57	904	34.92	601	46.58

During 2004-05 production of groundnut was 6.77 million tonnes in India, 0.07 million tonnes in Uttar Pradesh and 24573 tonnes in Jhansi district.

In India, area of groundnut was recorded 5.34 million ha. and production 7.46 million tonnes in 2016–17. The yield of groundnut per hectare was 1020 kg in India, 816 kg in Uttar Pradesh and 928 kg in Jhansi district in 2004-05. The area under groundnut in India was the highest in 2005–06 at 6.74 million ha. and the lowest was 4.60 million hectares in 2015–16.

The area under groundnut in Uttar Pradesh also kept on fluctuating from year to year. While in Jhansi district, the growth rate of area under groundnut was negative in six of the thirteen years under study during 2004-05 to 2016-17. The trend is similar in India and Uttar Pradesh with respect to the growth rate of production but Jhansi district was also negative in

some of the years under this study. This could be due to less rainfall from the national level to the district level.

The productivity of groundnut in India ranged between 1764 kg in 2013-14 and 866 kg in 2006-07. The yield per hectare in respect of the state of Uttar Pradesh fluctuated between 1000 kg per hectare in 2012-13 and 598 kg per hectare in 2007-08. The per hectare yield in Jhansi district was high at 1183 kg per hectare in 2010-11 and as low as 378 kg per hectare in 2007-08.

Comparative Statement of Groundnut Productivity

Table 6 shows the comparative analysis of groundnut productivity in Uttar Pradesh and Jhansi district during 2004-05 to 2016-17. The productivity of groundnut in Uttar Pradesh was highest at 1000 kg/ha

in 2011-12 and 2012-13 and low at 598 kg/ha in 2007-08. While the productivity of groundnut in Jhansi district was 1183 kg/ha during 2010-11. and as low as 378 kg/ha during 2007-08.

Table 6: Comparative analysis of groundnut productivity in Uttar Pradesh and in Jhansi district during 2004-05 to 2016-17.

Year	Uttar Pradesh	Jhansi
2004-05	816	928
2005-06	851	540
2006-07	730	519
2007-08	598	378
2008-09	705	747
2009-10	670	350
2010-11	988	1183
2011-12	1000	1076
2012-13	1000	975
2013-14	896	819
2014-15	857	889
2015-16	670	410
2016-17	904	601

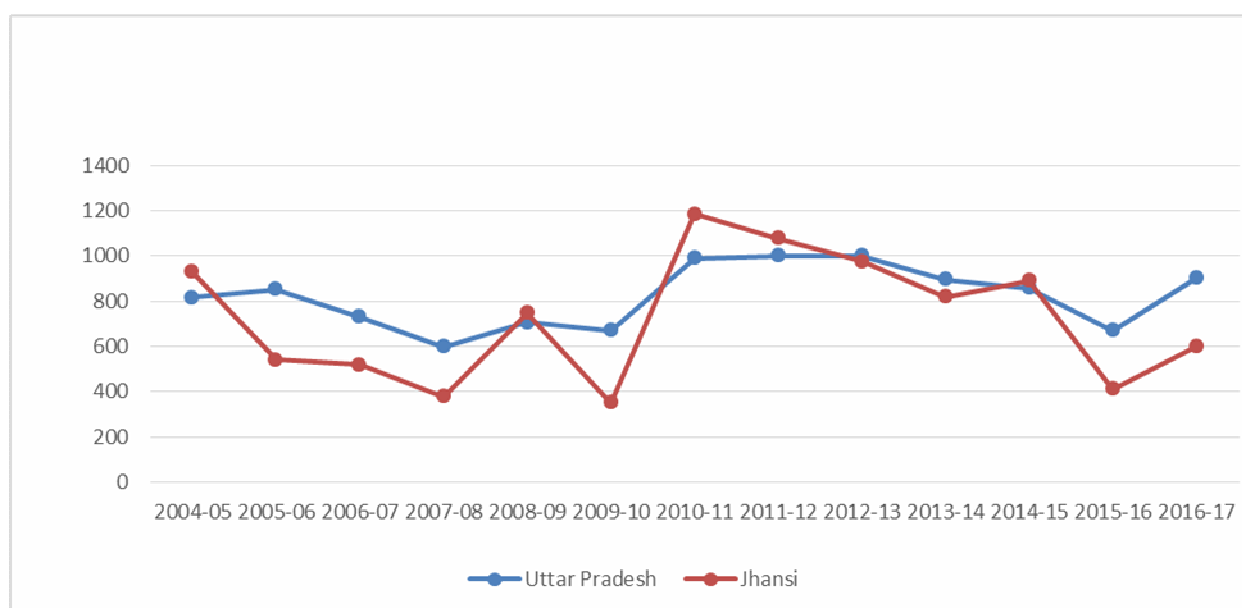


Fig. 5 : Productivity of Groundnut in Uttar Pradesh and Jhansi District

Table 7: Compound annual growth rates in area, production and productivity of India, Uttar Pradesh and Jhansi district during 2004-05 to 2016-17.

Particulars	Area	Production	Productivity
India	-2.65	0.53	3.25
Uttar Pradesh	0.010	1.61	1.31
Jhansi	1.82	2.95	1.18

The Compound Annual Growth Rate (CAGR) during 2004-05 to 2016-17 was found to be negative in India but positive in Uttar Pradesh (0.10) and Jhansi (1.82). In this study, it is observed that the growth rate

of area in Jhansi district has increased due to shifting of farmers from traditional crops to remunerative crops. In terms of production, the compound annual growth rate (CAGR) also observed in Jhansi district is

2.95 percent, as against 0.53 percent in India and 1.61 percent in Uttar Pradesh. The compound annual growth rate of productivity in India is higher at 3.25 percent as

compared to 1.31 percent in Uttar Pradesh and 1.18 percent in Jhansi.

Table 8 : Instability in area, production and productivity of groundnut crop in India and Uttar Pradesh.

Particulars	Area		Production		Productivity	
	CV	CVDI	CV	CVDI	CV	CVDI
India	12.61	7.27	21.17	22.03	20.64	17.34
Uttar Pradesh	8.13	8.49	15.00	14.33	16.61	16.52

Table 8 shows the instability of the groundnut crop in area, production and productivity using the two methods. The coefficient of variation indicates high area volatility in India with 12.61 per cent, while Uttar Pradesh is 8.13 per cent. Similarly, when the Cuddi-Della Valle instability Index is applied, Uttar Pradesh is found to have high volatility, followed by 8.49 per cent across India. with 7.27 per cent. By using both methods in terms of production, groundnut production for all India showed greater variability in groundnut production 21.17% and 15% in Uttar Pradesh and CVDI from 22.03% in India to 14.33% in Uttar Pradesh. Productivity volatility was higher in India with 20.64 and 17.34 percent as compared to 16.61 and 16.52 percent in Uttar Pradesh.

Conclusion

Groundnut is an oilseed crop of India. Especially in drought-prone areas like Jhansi district, due to rain-fed areas, lack of irrigation facilities and poor alternate cropping pattern, farmers in Jhansi district mainly adopt groundnut cultivation. It was also observed in Jhansi district that farmers are cultivating groundnut on a large scale since last many years.

To strengthen the overall economic condition and contribute to the national economy, Uttar Pradesh has to become self-sufficient in groundnut. Several policy and technical issues should be addressed to arrest the decline in the area by giving due importance to the oilseed crop and steps should be taken to assess the low yield levels, Due to which there will be a lot of help in increasing the production in the state and the production can be increased easily.

Conflict of Interest

The authors have no conflict of interest

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