

COTTON CULTIVATION IN HARYANA: A SPATIO-TEMPORAL STUDY FROM 1966 - 2015

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ABSTRACT: Cotton is one of the most important fiber and cash crop of India and plays an important role in the industrial and agricultural economy of the country. In the present paper an attempt has been made to study the trends in area under cotton and production of cotton in Haryana from 1966-67 to 2014-15. The area under cotton in state of Haryana has decreased over the time period from 1966 to 2015. There is not any uniform or continuous pattern regarding cotton cultivation in Haryana. The wide disparity of temperature, rainfall and soil features found in Haryana permits growing of different types of crops. They include cotton, rice and bajara crop in Kharif season and wheat, pulses and oilseeds etc in Rabi season. In order to examine the trend in area and production of cotton in the state, the triennium averages have been computed for the period 1966-69, 1990-93 and 2012-15. Haryana has recorded almost many fold increase in the area under cotton and production as per the data available it has increased from 127 thousand tonnes to 2577 thousand tonnes during the study area. In fact, over the period 1966-67 to 2014-15 alone, the cotton production has increased by more than 8 times.

Key Words: cotton cultivation, Desi cotton, American cotton, spatio-temporal

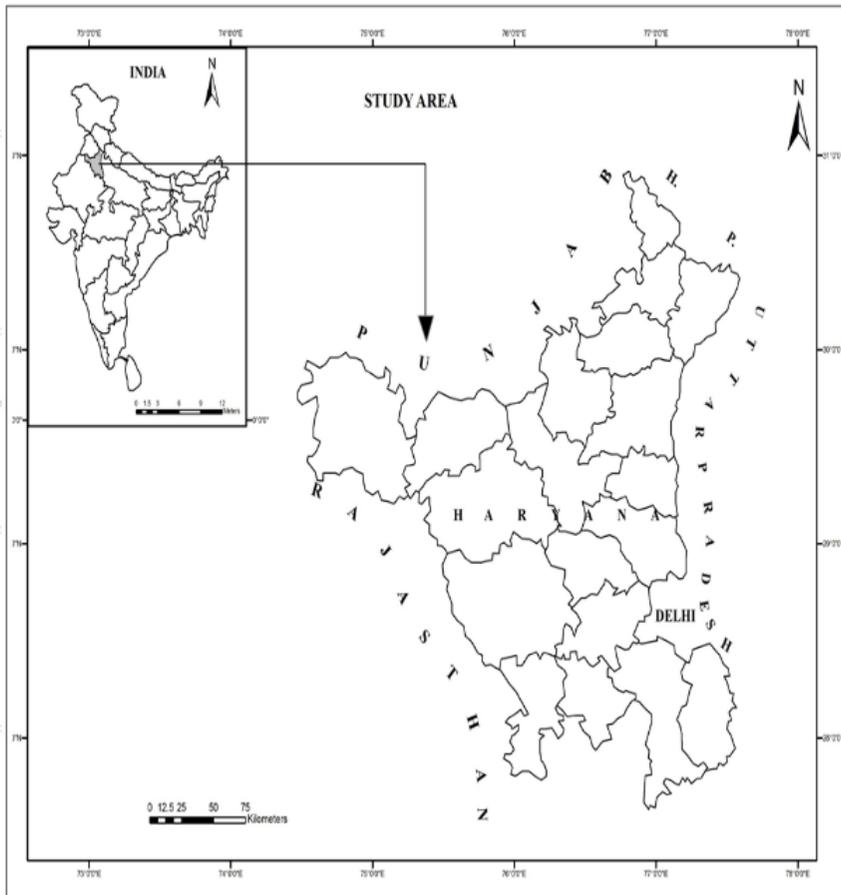
INTRODUCTION

Agriculture is the oldest and largest business in the world even today. Agriculture not only provides food and raw material but also employment opportunities to a very large proportion of population in our country. Haryana is the one of the agriculturally development states of India. In about 65.21 percent of population is directly engaged in a agriculture which contributes about 14 percent of GDP of the state. Cotton is one of the most important fiber and cash crop of India and plays an important role in the industrial and economy of the country. It's provides the basic raw material (fiber cotton) to cotton textile industry some districts of Haryana are bestowed the suitable agro climate condition for the production of cotton. Cotton industry in Haryana has become an integral part of socio-economic development of rural masses in some districts. The era of prosperity, in fact, was initiated through the production of cotton. (sandhu and chhabra 2001). Its seeds (binola) are used in vanaspati industry and can also be used as part of fodder for milch cattle to get better milk. The optimum temperature for vegetative growth is 21-27°C and it can tolerate temperature to the extent of 43°C but temperature below 21°C is detrimental to the crop. Warm day of cool night with large diurnal variation during the period of fruiting are conducive to good boll and fiber development. Bright day and dry climatic condition are required during its growing and picking times.

STUDY AREA

Haryana state is taken as the study area for present study. The state Haryana was carved out from the former state of Punjab on 1st November 1966 on the linguistic basis. It is the twentieth state of India and presently has 22 districts. The capital of Haryana is Chandigarh which is also the capital of its neighboring state Punjab. It is non coastal, interior state and located in the northern part of India. Haryana is bounded by Uttar Pradesh in the east, Himachal Pradesh in the north, Punjab in the west and Rajasthan in the south. It is located at an altitude of 200 meters above sea surface and extended between 27° 29' to 30° 55' north latitude and 74° 27' to 77° 36' east longitude with a total geographical area of 44212 sq. kilometer. Most of Haryana is in the plains with the Aravali mountain range starting its westward journey from here. It is a fertile alluvial plain with many rivers and extensive canal system. Its surface is slightly rolling. The main rivers that nourished the state are Yamuna and Ghaggar. In the whole of Haryana except the flood plains of Yamuna and Ghaggar, the alluvium is of the old type containing sand, clay, silt and hard calcareous concentration about the size of nuts known as kankars. In the Khaddar the deposits of the alluvium are the recent type. They consist of coarse sand and some silt regularly deposited by the rivers and small mountain stream of the Indo-Gangetic watershed. With just 1.37 percent of total geographical area and less than two percent of India population Haryana has carved out a special niche of distinction for itself, whether it is agriculture or industry, canal based irrigation or rural electrification, Haryana keeps marching towards modernity. The

state enjoys the unique distinction of being among the first in the country to provide electricity, mettle, roads and potable drinking water to all its villages.



OBJECTIVES:

The present study pertains to cotton cultivation. The objectives of the study are as following

- 1) To study the temporal pattern of cotton cultivation from 1966 to 2015.
- 2) To examine the spatial pattern of area and production of cotton.

RESEARCH METHODOLOGY

The present study is based on the secondary data. The districts wise data related to area under cotton cultivation and production of cotton has been collected from the statistical abstract of Haryana. In order to examine the temporal and spatial variations in the area and production the triennium average of production of cotton has been computed for the period 1966-69, 1990-93 and 2012-15. The map has been prepared with the help of choropleth mapping technique. The spatial pattern of production of cotton in Haryana is shown with choropleth map.

Average of triennium of area, and production is used for the study. Average = $\text{sum of the value of three year} \div 3 \times 100$

Proportion of area under cotton = $\text{area under cotton} \div \text{average triennium total cropped area} \times 100$

LITERATURE REVIEW

Sharma et al. (2014) studied that competitiveness of Indian agriculture sector: A case study of cotton crop. They have also estimated the comparative advantage in cotton production and cotton diversification by calculation various indicators. The study reveals that India has comparative advantage in production and export of cotton in recent years. Kumar (2015) studied that the trends in production of cotton in Haryana from 1966-2012. The study is based on secondary data, collected from Department of Agriculture, Panchkula for the period 1966-69, 1982-85 and 2009-12. The study reveals that American cotton production has been increased. However, the proportion of Desi cotton decreased during the period. Malik

et al. (2018) analysis that adoption returns and initiatives for Bt cotton cultivation. Data has been collected from Agricultural Statistics at a Glance Department of Agriculture and Farmers welfare of Govt. of Haryana. The study reveals that area under cotton in last decade showed an increasing trend. The trend of cotton has been declining in Madhya Pradesh. Cotton area shifted to oilseeds in Madhya Pradesh as farmers prefer to cultivate soya bean crop in rained conditions instead of cotton. Chand et al. (2012) analyzed temporal and its determinants. They were selected 16 major crops with different time period. The study reveals that the rapid expansion of agricultural credit, reinvigorated growth in the distribution of quality, seeds, substantial public and private investment have found in the agriculture sector. Guo (2018) studied that spatial and temporal trend of irrigated cotton yield in the southern high plains. The study concluded that spatial and temporal yield pattern is inflected by soil texture, and water holding capacity in this region. Cotton yield had substantial spatial and temporal variability. Physical and chemical properties of soils that affect yield variability. Sanjay et al. (2018) analyzed the growth and instability in cotton cultivation in northern India. The study is based on secondary data from 1966-67 to 2013-14. They were used semi log linear function, compounded annual growth rate and cuddy Della Valle index. The study reveals that over the time period economic performance of cotton in Haryana witnessed a positive significant trend. Reddy et al. (2014) studied that the spatio- temporal variations in cotton productivity India. The study is based on secondary data collected from various sources for the time period 1980-81 to 2009-10. The study concluded that spatio and temporal variation in cotton yield exist among cotton growing districts in India. Total thirty three cotton growing districts found in India. In this region cotton is grown in large area but productivity is low. Major factor causing these variations are percent irrigated area, nitrogen and phosphorus applied. And fifteen districts of India with high productivity but area under cotton is less.

RESULTS AND DISSCUSION

TREND OF PROPORTION OF AREA UNDER COTTON

Fig 1.1 presents the trend of area under cotton in Haryana state from 1966-67 to 2014-15. The graph is showing so much fluctuation in the trend of area under cotton over the time period 1966-67 to 2014-15. It is clear from the graph that the area under cotton decreased and increased from 1966-67 to the 2014-15 in the state. Cotton is cultivated on 151.81 thousand hectare area in 2014-15 while it was cultivated on 183 thousand hectare area in 1966-67 in Haryana. Year 1996-97 recorded highest area under cotton cultivation i.e. 652.6 thousand hectare and year 2013-14 recorded lowest area with 137.84 thousand hectare area under cotton cultivation in the state.

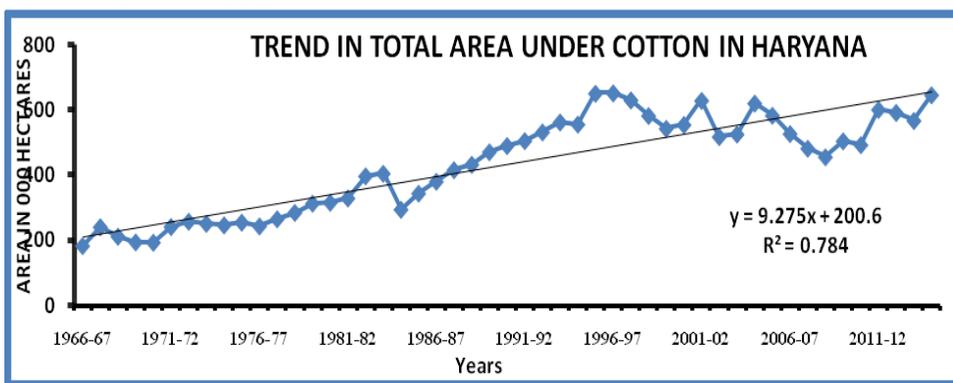


Fig 1.1

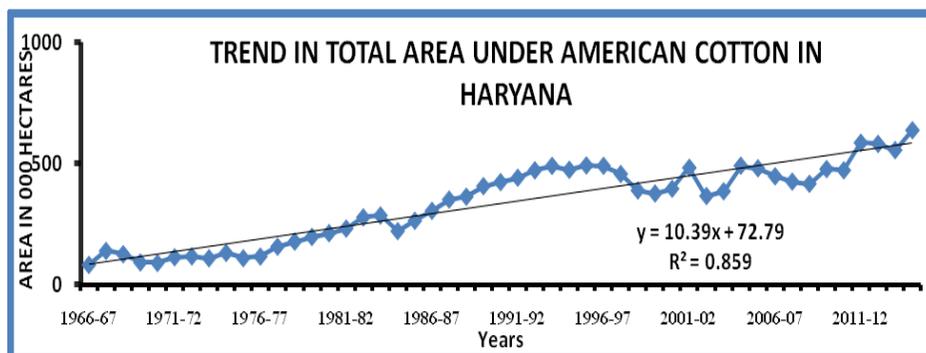


Fig 1.2

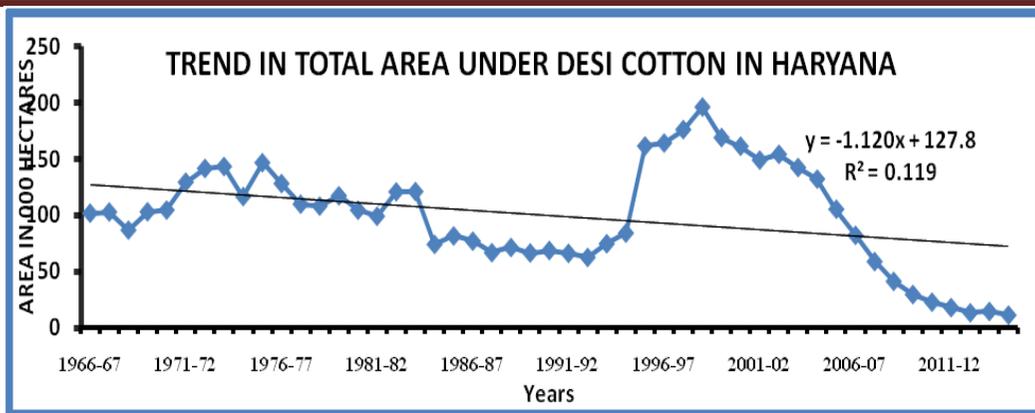


Fig 1.3

Fig 1.2 shows that the trend of area under American cotton in Haryana state from 1966-67 to 2014-15. It is clear from the graph that the area under American cotton increasing from 1966-67 to 2014-15 in the state. American cotton is cultivated on 139.6 thousand hectare area in 2014-15 however, is cultivated on 81 thousand hectare area in 1966-67 Haryana. Year 1995-96 recorded highest area under American cotton i.e. 490 thousand hectare and year 1966-67 recorded lowest area with 81 thousand hectare area under American cotton cultivation in the state. There are three year in which area under American cotton was below 100 thousand hectare in the state i.e. 1966-67, 1969-70 and 1970-71. After 1970-71 area under American cotton cultivation showing huge increase which quickly come down in 2012-13. Fig 1.3 present the trend of area under Desi cotton in Haryana state from 1966-67 to 2014-15. It is clear from the graph that the area under Desi cotton decreasing from 1966-67 to 2014-15 in the state.

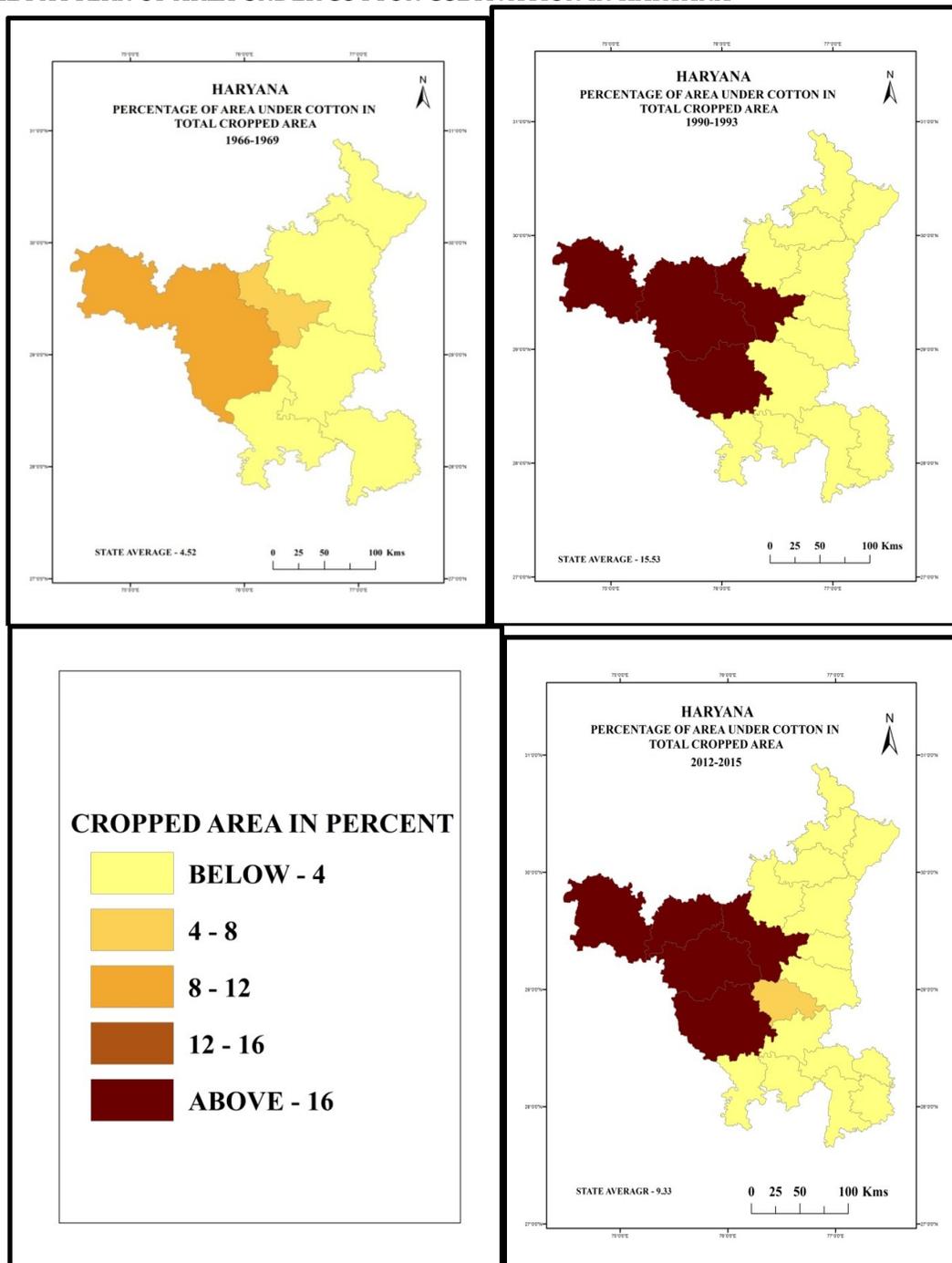
Table 1.1

percentage of area under cotton in total cropped area			
District	1966-67	1990-93	2012-15
AMBALA	1.07	0.00	0.00
KARNAL	2.44	0.02	0.01
ROHTAK	2.33	3.51	4.49
GURGAON	0.32	0.00	0.15
MEHANDERGARH	0.08	0.00	1.20
JIND	5.32	19.22	38.66
HISAR	10.13	46.29	36.34
SONIPAT		0.13	0.76
BHIWANI		57.49	25.79
KURUSHETRA		0.00	0.00
SIRSA		71.75	38.98
FARIDABAD		0.26	0.09
YMUNANAGAR		0.00	0.00
KAITHAL		2.80	1.75
PANIPAT		0.00	0.05
REWARI		0.00	0.66
PANCHKULA			0.00
JHAJJAR			1.11
FATEHABAD			48.15
MEWAT			0.16
PALWAL			0.83
HARYANA	4.52	15.53	9.33

DISTRICT-WISE PATTERN OF COTTON CULTIVATION

Table 1.1 shows the pattern of district wise area under cotton cultivation to total cropped area in the state during 1966-69, 1990-93 and 2012-15 time periods. It is evident that cotton was grown almost in whole Haryana at the time of foundation of the state. However, its proportion was extremely low in northeastern and southeastern region of the state. Western and southwestern part of Haryana was having appreciable proportion of area under cotton cultivation to total cropped area in 1966-69 time periods. In 1966-69 proportion of area under cotton was highest in Hisar district with 10.13 percent area under cotton cultivation. On the contrary, lowest in Mahendergarh district with 0.08 percent area under cotton cultivation.

SPATIAL PATTERN OF AREA UNDER COTTON CULTIVATION IN HARYANA



In 1990-93, the proportion of the area under cotton got expanded. Now it was totally washed out from the northeastern Haryana (Ambala, Kurukshetra, Panipat and Yamunanagar) district and southern Haryana (Gurgaon, Mahendergarh, Rewari) districts. Sirsa placed at first in the state in term of proportion of area under cotton cultivation with 71.75 percent of area under cotton cultivation to total cropped area. While Bhiwani district placed at second with 57.49 percent area under cotton cultivation in the state. Out of sixteen, ten districts of the state having less than 1.00 percent area under cotton cultivation to total cropped area (Ambala, Karnal, Sonipat, Gurgaon and Mahendergarh) districts. It is interesting to know that there was a huge difference between the proportional area of cotton.

During 2012-15, Fatehabad and Sirsa placed at first and second rank in the state in term of proportion of area under cotton cultivation with 48.15 and 38.98 percent acreage respectively. In 1990-93 at the state level proportion of area under cotton cultivation have found 15.53 percent it has decreased in 2012-15. Only Rohtak district make one point percent increase in the proportion of area under cotton cultivation from 1990-93 to 2012-15. Declining proportional area under cotton proved that farmers trend to the cultivation of other crops like rice wheat and vegetables in spite of cotton.

Trend of production of cotton

Production is the function of area and yield if one out of two increases, production increases. Fig 2.1 depicts the trend of production of cotton in Haryana over the time period 1966-67 to 2012-15.

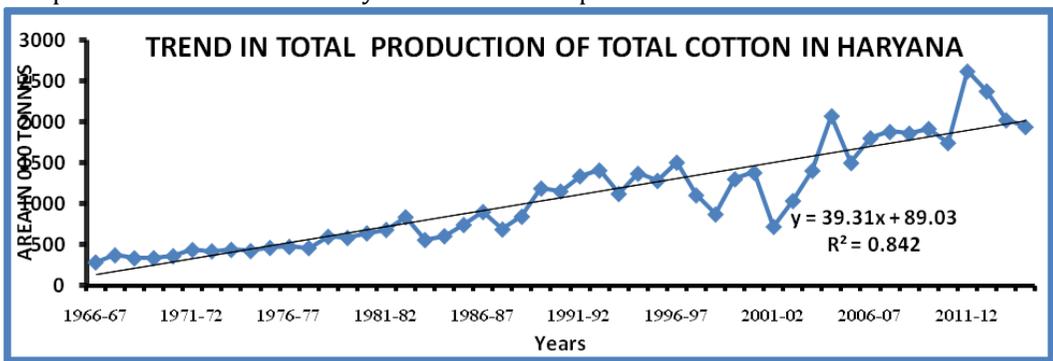


Fig 2.1

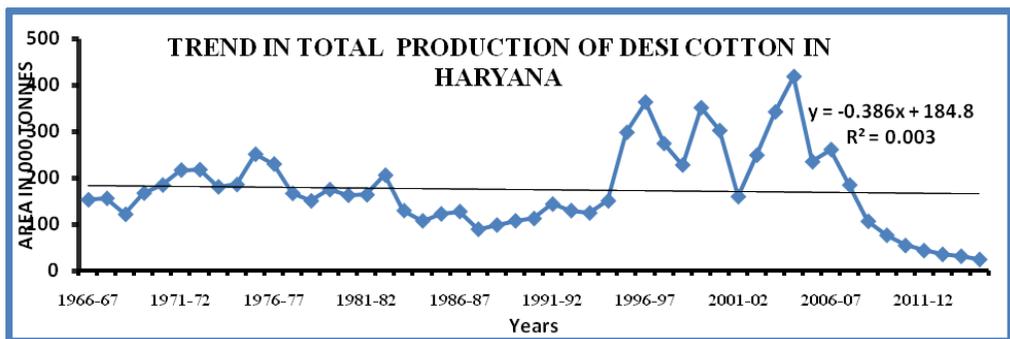


Fig 2.2

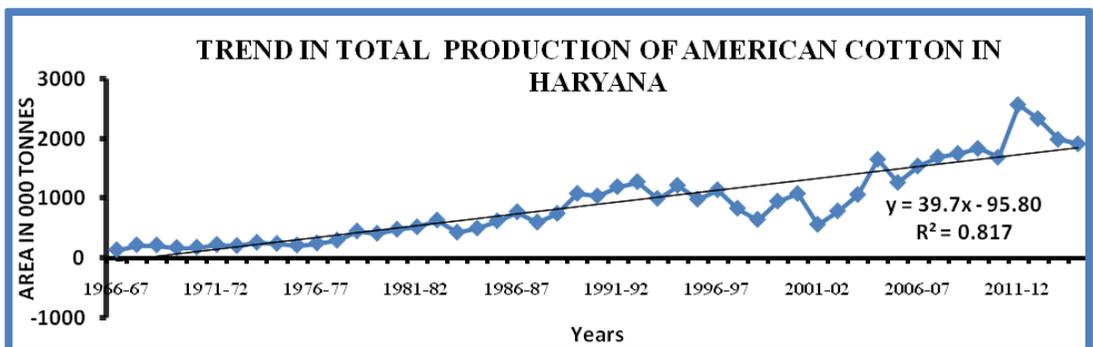


Fig 2.3

There is a significant fluctuation in the production of cotton. Over the time period 1966-67 to 2014-15 in Haryana state as it is evident from the graph. The production of cotton increased quite rapidly in the state during last few decades. Graph shows two peak years 2004-05 and 2011-12 having high production with 2075 and 2621 thousand tonnes production of cotton respectively. These are the years in which area under cotton was high during 1966-67 to 2014-15. The year 2013-14 recorded lowest production of cotton in the state. Fig 2.2 presents the trend of production of Desi cotton in Haryana state from 1966-67 to 2014-15. It is clear that the production of Desi cotton decreased from 1966-67 to 2014-15 in the state. The graph shows that tree peak year 1996-97, 1999-2000 and 2004-05 having high production with 363, 351 and 418 thousand tonnes production of cotton respectively. Fig 2.3 shows that the trend of production of American cotton in Haryana state from 1966-67 to 2014-15. The graph shows that over the period 1966-67 to 2014-15 Haryana has recorded almost many fold increase in the American cotton production. It has increased from 127 thousand tonnes to 2577 thousand tonnes during the study period. Graph shows that one peak year 2011-12 having highest production with 2577 thousand tonnes production of American cotton. The year 2014-15 recorded lowest production of American cotton in the state.

Table 1.2

Production of cotton			
District	1966-69	1990-93	2012-15
AMBALA	2.71	0	0
KARNAL	18.13	0.33	0
ROHTAK	18.06	13.67	21
GURGAON	1.54	0	0
M.GARH	0.37	0	11.33
JIND	17.51	87.67	151.66
HISAR	237.86	662.33	256.34
SONIPAT	0	1.33	7
BHIWANI	0	63.33	150.34
KURUSHETRA	0	0	0
SIRSA	0	462.34	483.66
FARIDABAD	0	0.67	0
YMUNANAGAR	0	0	0
KAITHAL	0	9.66	26
PANIPAT	0	0.33	0
REWARI	0	0	2.67
PANCHKULA	0	0	0
JHAJJAR	0	0	6.67
FATEHABAD	0	0	223.67
MEWAT	0	0	1
PALWAL	0	0	5.33
HARYANA	296.19	1302.33	2115.33

Source: statistical Abstract of Haryana.

DISTRICT WISE PATTERN OF COTTON PRODUCTION

Spatial pattern of cotton production in the state has been analyzed with respect to three triennium 1966-69, 1990-93 and 2012-15. In 1966-69 Hisar district recorded highest production 237.86 thousand tonnes in the state. Mahendergarh was placed at the last rank with production of 0.37 thousand tonnes of cotton. Up to 1990-93 Hisar and Jind district made a significant increase in the production due to increase in area. Hisar district placed at first place in the state in term of production of cotton. The second place in term of cotton production in the state was occupied by Sirsa district during 1990-93 with 462.34 thousand tonnes cotton production while, Kaithal and Karnal districts were placed last among districts with 0.33 thousand tonnes of cotton production. Rest of the state included Ambala, Panchkula, Rohtak, Mahendergarh, Jhajjar and Rewari districts was below 50 thousand tonnes of cotton production during 1990-93. The districts of south Haryana (Gurgaon and Faridabad) was almost no cotton during the period. But overall production of Haryana state got increased from 296.19 thousand tonnes in 1966-69 to 2115.33 thousand tonnes in 2012-15. During 2012-15 Sirsa district placed at first largest cotton producer of the state with 483.66 thousand tonnes of cotton production while the place of lowest cotton producer of the state taken by Mewat with one thousand tonnes of cotton production.

CONCLUSION

Cotton is an important industrial crop. It covered 9.33 percent area of the total cropped area. In the study area the percent share of cotton cultivation is very less. The proportion of cotton is not in uniform pattern. The high proportion is found in the district namely Sirsa, Fatehabad, Hisar districts. Karnal, Ambala, Yamunanagar, Panipat, Panchkula, Gurgaon and Faridabad are the districts where the cotton is not growing. The reasons for not growing cotton in north and north eastern Haryana there are good facility of irrigation and developed agricultural infrastructure. These districts prefer to grow rice, wheat, maize, mustard and vegetables than cotton. So we can say that western and southwestern districts of Haryana are better than north and northeastern part of Haryana in cotton cultivation. The farmers are shifting from Desi cotton to American cotton. Over the period proportion of area and production have decreased in under Desi cotton in the state of Haryana. The American cotton has bright future in the state. Whereas Desi cotton is going to be extinct with the passage of time. The overall analysis shows that the trend of cotton is decline in Haryana.

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