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Research Paper

An analysis of trend in production, consumption and trade of cotton in India

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ABSTRACT : Cotton, which is called as white gold, is one of the most important fibre crops grown in India, known for its trade value than any other fibre crops like, jute and mesta. Cotton cultivation in India is a source of livelihood for a considerable share of the farming community. Besides, the king of textiles, provide employment through textile mills and spinning mills to people in many parts of the country. A positive trend could be observed in the area, production and yield of cotton over the years. In particular, the productivity led growth in production witnesses the development of research activities which provides high yielding varieties and suitable efficient resource utilization techniques. Though improvement in the cotton production could be realized, increased consumption has decreased the export quantity of cotton over the years. Ultimately, cotton imports have increased with a growth rate of 12 per cent per annum, in the last decade. Moreover, the import price of cotton is very much higher than the price at which it is exported. To sum up, necessary steps should be taken to stabilize the cotton market and prevention measures should be taken to protect the crops from pest damage and uncertain natural calamities to stabilize the market from price fluctuations.

KEY WORDS : Analysis of trend, Production, Consumption, Trade of cotton

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INTRODUCTION :

Cotton is the most important fibre crop of India. Cultivation of cotton started approximately 7000 years ago in Mexico (New world) and in India and Pakistan (Old world). Out of roughly 43 species of cotton, only four are cultivated on a large scale *(Gossypium hirsutum, Gossypium barbadense, Gossypium arboreum, Gossypium herbaceum).* Cotton grows in tropical and subtropical parts of Asia, Africa, Australia and America. People cultivate cotton because of the seed that represent valuable source of fibres and oil. Each year, around 25 million tons of cotton is produced in the 70 countries around the world. International cotton trade is 12 billion dollars worth business. China is the greatest manufacturer of cotton in the world.

India is one of the largest producers of cotton in the world accounting for about 27 per cent of the world cotton production, which has the distinction of having the largest area under cotton cultivation in the world ranging between

11.9 million hectares to 12.8 million hectares and constituting about 38 per cent to 41 per cent of the world area under cotton cultivation. The yield per hectare (*i.e.* 504 kg to 566 kg per hectare) is however, still lower against the world average of about 701 kg to 766 kg per hectare. Country is expected to make more strides in cotton production in the years to come.

Over the years, India has achieved a significant quantitative increase in cotton production. Till 1970s, country used to import massive quantities of cotton in the range of 8.00 to 9.00 lakh bales per annum. However, after Government launched special schemes like intensive cotton production programmes through successive five-year plans, that cotton production received the necessary impetus through increase in area and sowing of Hybrid varieties around mid 70s. Since then country has become self-sufficient in cotton production barring few years in the late 90s and early 20s when large quantities of cotton had to be imported due to lower crop production and increasing cotton requirements of the domestic textile industry.

Since launch of " Technology mission on cotton" by Government of India in February 2000 significant achievements have been made in increasing yield and production through development of high yielding varieties, appropriate transfer of technology, better farm management practices, increased area under cultivation of Bt cotton hybrids etc. All these developments have resulted into a turnaround in cotton production in the country since last 6 to7 years. The yield per hectare which was stagnant at about 300 kg/ha for so many years, jumped to 472 kg in the year 2005-06 and now it reached to the level of 504 kg to 566 kg per hectare. Though this per hectare yield is still lower against the world average of about 705 kg to 805 kg per hectare, country is expected to make more strides in cotton production in the years to come. The fundamental changes that taking place in the realm of cotton cultivation in the country, are having the potential to take the current productivity level near to the world average in the near future.

The domestic textile industry is one of the largest industries in the country and has witnessed a phenomenal growth in the last two decades in terms of installed spindlage and yarn production. The significant features of this growth include installation of open-end rotors and setting up of export-oriented units. Technology-wise, Indian spinning industry has been able to keep pace with the international technology trends to a fair degree and this pace of modernization received a fillip after launching of "Technology upgradation fund" by the Government of India in April 1999.

The mushroom growth of spinning industry and its modernization has led to sustained growth in cotton consumption especially during the years when country harvested good crop production. After achieving a sustained growth in cotton consumption during tenth plan period, domestic cotton consumption has been increasing steadily.

Objectives:

– To study the trend and instability in area, production and productivity of cotton in India

– To analyze the growth in export and import of cotton in India.

MATERIALS AND METHODS :

Growth rates :

The compound growth rates in area, production and productivity were estimated from the time series data for the period from 1950-51 to 2015-16, collected from various journals and e-resources.

The following analytical tool was used to estimate the growth rates (Nethrayani, 2013).

$$Y_t = A B^t V_t \quad \ldots. (1)$$

where,

Y_t = Area, production and productivity in the year t

A = Intercept indicating Y in the base period (t = 0)

B = 1 + g

t = Time period

V_t = Random disturbance term

Eq. (1) was converted into the logarithmic form as follows to make it in a linear form:

$$\ln Yt = \ln A + t * \ln B + \ln V_t$$

This is of the following form :

$$Qt = a + bt + U_t \quad \ldots\ldots(2)$$

where,

Qt = ln Y

a = ln A

b = ln B

Ut = ln V_t

The values of 'a' and 'b' were estimated by using ordinary least squares estimation technique. Later, the original 'A' and 'B' parameters in Eq. (1) were obtained by taking antilogarithms of 'a' and 'b' values as:

A = Antilog (a)

B = Antilog (b)

Average annual compound growth rate (%) was calculated as follows:

$$g = (B - 1) * 100$$

Instability (Cuddy-Della Valle Index) :

To estimate the instability in area, production, productivity, exports and imports, the Cuddy-Della Valle Index (Cuddy and Della, 1978) was used. This helps to know the variability and risk in those variables. Sendhil *et al.* (2012) in their study used Cuddy-Della Valle Index to explore the performance of wheat production in India.

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

where,

CV= Co-efficient of variation in per cent.

R^2= Co-efficient of determination from a time trend regression adjusted to its degrees of freedom.

Co-efficient of variation (CV) :

The co-efficient of variation (CV) has been worked out to find out the variation variation in the area, production, yield, exports and imports of cotton in India, over the years.

$$CV = \frac{\text{Standard deviation}}{\text{Mean}} \times 100$$

Descriptive statistics :

Descriptive tools like mean, standard deviation, average and percentage has been worked out for variables like, area, production, productivity, imports, exports and consumption.

RESULTS AND DATA ANALYSIS :

Table 1 depicts the area, production and productivity of cotton in India from 1950-51 to 2014-15. It is clear from the table that, there is a tremendous increase in the area cultivated, production and productivity. Among the three parameters, production has a better improvement with an annual growth rate of 4 per cent followed by productivity (3%) and area (1%). In addition, a vast variation has been observed in production with a CV of

Table 1: Area, production and productivity of cotton in India

Year	Area (lakh hectares)	Production (lakh bales of 170 kg)	Yield (kg per hectare)
1950-51	58.82	34	99
1960-61	76.10	60	134
1970-71	76.05	57	127
1980-81	78.23	78	169
1990-91	74.39	117	267
2000-01	85.76	140	278
2001-02	87.30	158	308
2002-03	76.67	136	302
2003-04	76.30	179	399
2004-05	87.86	243	470
2005-06	86.77	241	472
2006-07	91.44	280	521
2007-08	94.14	307	554
2008-09	94.06	290	524
2009-10	103.10	305	503
2010-11	111.42	339	517
2011-12	121.78	367	512
2012-13	119.78	370	525
2013-14	119.60	398	566
2014-15	128.19	380	504
CAGR (%)	1	4	3
Co-efficient of variation (%)	20.67	53.82	41.50
Cuddy della valle index (%)	7.24	8.23	15.94

(Source: Statistical database, cotton corporation of India)

53.82 per cent, which is 41.5 and 20.67 per cent, respectively. However, productivity is highly instable (extent of risks and variability is more) over the years which have a Cuddy Della Valle Index of 15.94 per cent. On the other hand, it is less in case of area (7.24%).

Table 2 describes the state wise area, production and yield of cotton in India from 2012-13 to 2014-15. It is evident from the table that, Maharashtra leads the table in case of area in all the three years with about 41.90 lakh hectares in 2014-15 followed by Gujarat. However, production and productivity have shown a lot of fluctuation in the mentioned years. In all the three years production is highest in Gujarat followed by Maharashtra. Among the South Indian states, Andhra Pradesh, Telangana (from 2014-15), Karnataka and Tamil Nadu produces a considerable amount of cotton, with Telangana as the highest producer in 2014-15. There is a huge fluctuation in the productivity of cotton among all the mentioned states, with a highest yield recorded in Gujarat in 2013-14.

Table 3 describes about the import, consumption and export of cotton in India from 2006-07 to 2014-15. It could be seen from the table that, import has increased over the years with an annual growth rate of 12.70 per cent. In contrast, export has decreased from 2006-07 to 2014-15 with an annual growth rate of -0.06 per cent. It should be noted that, though both total cotton availability and consumption have increased over the years the annual

Table 2: State wise area, production and yield of cotton from 2012-13 to 2014-15

(Area in lakh hectares, production in lakh lales of 170 kg, yield in kg/ha.)

States	2012-13			2013-14			2014-15		
	Area	Prod	Yield	Area	Prod	Yield	Area	Prod	Yield
Gujarat	25.0	93	633	25.19	124	837	27.73	108	662
Maharashtra	41.5	81	332	41.92	84	341	41.9	78	316
Telangana	--	--	--	--	--	--	17.13	57	566
Andhra Pradesh	24.0	84	595	23.89	78	555	8.21	27	559
Karnataka	4.9	17	596	6.62	23	591	8.75	31.5	612
Haryana	6.1	26	720	5.36	24	761	6.48	20.5	538
Madhya Pradesh	6.1	19	531	5.14	19	628	5.47	18	559
Rajasthan	4.5	17	642	3.93	14	606	4.87	17	593
Punjab	4.8	21	744	4.46	21	800	4.2	12	486
Tamil Nadu	1.3	6	797	1.52	5	559	1.87	5	455
Orissa	1.2	4	571	1.24	4	548	1.27	4	535
Others	0.5	2	667	0.33	2	1030	0.31	2	1097
Total	119.8	370	525	119.6	398	566	128.19	380	504

(Source: Statistical database, cotton crporation of India)

Table 3 : Import, consumption and export of cotton in India from 2006-07 to 2014-15 **(Quantity in lakh bales of 170 kg)**

Item	Import	Total availability	Total consumption	% to total availability	Export	% to total availability	Carry forward
2006-07	5.53	337.53	232.03	68.74	58.00	17.18	47.5
2007-08	6.38	360.88	236.88	65.64	88.50	24.52	35.5
2008-09	10.00	335.50	229.00	68.26	35.00	10.43	71.5
2009-10	6.00	382.50	259.00	67.71	83.00	21.70	40.5
2010-11	2.38	381.88	259.61	67.98	76.50	20.03	45.7
2011-12	7.51	420.28	250.71	59.65	129.57	30.83	40.0
2012-13	14.59	424.59	283.16	66.69	101.43	23.89	40.0
2013-14	11.51	449.51	299.55	66.64	116.96	26.02	33.0
2014-15	14.39	427.39	317.67	74.33	57.72	13.51	52.0
CAGR (%)	12.70	2.99	4.00	(Avg.) 67 %	-0.06	(Avg.) 21 %	1.14

(Source: Statistical database, cotton corporation of India)

growth rate of consumption (4%) is more than availability (2.99%). On an average, about 67 per cent of the total available cotton has been consumed locally and only about 21 per cent of the cotton has been exported to various countries between 2006-07 and 2014-15.

Table 4 depicts the quantity and value of cotton export in India from 2005-06 to 2014-15. It could be observed that quantity and value in export of cotton has increased over the years. However, the growth in the quantity of cotton (2%) is lesser than the growth in value of export (10%). It should be noted that, price of cotton per bale was Rs. 8,407 in 2005-06, which has witnessed an annual growth of 8 per cent and in 2014-15 it was Rs. 16,459 per bale. Moreover, co-efficient of variation is high is case of value of export (61.70%) followed by quantity (38.64%) and price (31.70%). And Cuddy Della Valle Index is also high in case of value of export (43.8 %) followed by quantity (33.26%) and price (14.99%). So this implies that the extent of risk and variability is more in value of export followed by quantity and price per bale.

Table 5 depicts the quantity and value of cotton import in India from 2005-06 to 2014-15. It could be observed that quantity and value in import of cotton has

Table 4 : Quantity and value of cotton export in India from 2005-06 to 2014-15

(Quantity in lakh bales of 170 kg each)

Year	Quantity	Value in Rs. crore	Price per bale (Rs.)
2005-06	47.0	3951.35	8407
2006-07	58.0	5267.08	9081
2007-08	88.5	8365.98	9453
2008-09	35.0	3837.13	10963
2009-10	83.0	10270.21	12374
2010-11	76.5	14483.31	18932
2011-12	129.6	23488.59	18128
2012-13	101.4	17462.87	17217
2013-14	117.0	23153.24	19796
2014-15	57.7	9499.87	16459
CAGR (%)	2	10	8
Co-efficient of variation (%)	38.64	61.70	31.70
Cuddy della valle index (%)	33.26	43.78	14.99

(Source: Statistical database, cotton corporation of India)

Table 5: Quantity and value of cotton import in India from 2005-06 to 2014-15

(Quantity in lakh bales of 170 kg each)

Year	Quantity	Value in Rs. crore	Price per bale
2005-06	5.0	695.77	13915
2006-07	5.5	752.29	13604
2007-08	6.4	978.54	15338
2008-09	10.0	1377.80	13778
2009-10	6.0	1195.64	19927
2010-11	2.4	1709.11	71811
2011-12	7.5	1059.20	14104
2012-13	14.6	2057.77	14104
2013-14	11.5	2746.16	23859
2014-15	14.4	2848.50	19795
CAGR (%)	12	17	4
Co-efficient of variation (%)	49.51	50.64	81.03
Cuddy della valle index (%)	35.57	22.11	79.76

(Source: Statistical database, cotton corporation of India)

increased over the years. However, the growth in the quantity of cotton (12%) is lesser than the growth in value of export (17%). It should be noted that, price of cotton per bale was Rs. 13915 in 2005-06, which has witnessed an annual growth of 4 per cent and in 2014-15 it was Rs. 19795 per bale. Moreover, co-efficient of variation is high is case of price (81.03%) followed by value of export (50.64 %) and quantity (49.51%). However, more instability and extent of risks in variables is found in price per bale (79.76%) followed by quantity (35.57%) and value of export (22.11%).

Findings of the study :

It could be concluded from the study that, there is a significant improvement in the area, production and productivity of cotton in India, over the years. The increased production is greatly due to the improvement in the productivity of the crop and also due to a considerable growth in the cultivated area. Among the states, Gujarat, Maharashtra and Andhra Pradesh (including Telangana) have a greater share in area and production of cotton in India. However, in case of productivity, Gujarat holds the top spot. Domestic consumption of cotton in India is about 67 per cent, but export is only 21 per cent of the total cotton available, in the last 10 years. It should be noted that import has surpassed export in 2014-15. The export and import data revealed that, the annual growth in export is very much lesser than that in imports. Besides, the price per bale of cotton which is exported is less stable than that of the imported cotton. Moreover, the import price of cotton is higher than the export price in almost all the years.

Policy implications :

This study revealed that Government has to take necessary steps to minimize the risks and uncertainty in cotton production. There is need of measures to stabilize price fluctuations in cotton market by providing financial and technical supports to farmers who grow cotton in India. This study also suggests that there is a necessity to increase productivity through advanced research, mechanization of farm to improve efficiency and increase export by increasing production.

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LITERATURE CITED :

Balakrishna, A. (2012). Economics of Bt cotton in India. *J. Develop. & Agric. Econ.*, **4**(5) : 119-124.

Chand, Ramesh and Raju, S.S. (2008). Instability in Andhra Pradesh agriculture – A disaggregate analysis. *Agric. Econ. Res. Rev.*, **21**: 283–288.

Cotton Corporation of India.

Cuddy, J. D. A. and Della, Valle P. A. (1978). Measuring the instability of time series data. *Oxford Bull. Econ. & Statist.*, **40**(1): 79-85.

Eisa, H.M., Barghoufi, S.,Gillham, F. and Al-Saffy, M.T. (1994). *Cotton production prospects for the decade to 2005: A Global Overview*, Worid Bank Technical Paper No 231, Washington, D.C., U.S.A

Evans, S. and Bell, T.M. (1978). How cotton acreage, yield and production respond to price changes. *Agric. Econ. Res.*, **30**: 10-15.

Ministry of Textiles (Government of India).

Nethrayani, K. R. (2013). Impact assessment of Technology Mission on Oilseeds and Pulses. Ph.D. Thesis, University of Agricultural Sciences, Dharwad, KARNATAKA (INDIA).

Sendhil, Ramdas, Singh, Randhir and Sharma, Indu (2012). Exploring the performance of wheat production in India. *J. Wheat Res.*, **4** (2): 37-44.