

## A COMPARATIVE STUDY OF GROWTH AND INSTABILITY IN COTTON AND MAN-MADE FIBERS IN INDIA

Ankita Rajput<sup>1\*</sup>, Dr. P.S. Raghuwanshi<sup>2\*</sup>, Poonam Chaturvedi<sup>3\*</sup>

1-Ph. D. Scholar at college of agriculture, Gwalior (RVSKVV), Orcid id- 0009-0001-9524-3974

2- Professor and Head, College of Agriculture, Sehore (RVSKVV) Orcid id- 0009-0006-2847-4744

3- Ph. D. Scholar at college of agriculture, Jabalpur (JNKVV) Orcid id- 0000-0002-1453-835X

ankitarajput958@gmail.com

(MS Received: 15.07.2023; MS Revised:24.08.2023; MS Accepted:25.08.2023)



MS 3096

(RESEARCH PAPER IN AGRICULTURE)

## Abstract

The study was conducted to compare the growth and instability between cotton and man-made fibers. The data on cotton production was obtained from faostat. The data on man-made fibers production is taken from the website of indiastat.com. The study period for the study is from 1981-82 to 2020-21. The data is further divided into two periods of twenty years each; Period I:1981-82 to 2000-01 and Period II: 2001-02 to 2020-21. The results were also calculated for the overall period. The statistical tools used in the study were compound growth rate and instability index. The results showed that over the study period the growth rate for man-made fibers was higher in comparison to cotton, although the variability was higher in man-made fiber production.

**Key words-** growth and instability, cotton and man-made fibers, variability.

## Introduction

The Indian textile industry is different from that of other countries because of its close connections with agriculture, along with linkages to country's customs and traditions. In the year 2021-22, India exported US \$ 44.4 billion in textiles and apparel (T&A). The major destination was US with 27 per cent share followed by EU (18 per cent), Bangladesh (12 per cent) and UAE (6 per cent). Exports of cotton textiles were US\$ 17.2 billion, accounting for 39 per cent of all exports, and they increased by 54 per cent and 67 per cent in 2021-22 compared to FY 2020-21 and FY 2019-20, respectively. The export of man-made textiles was US\$ 6.3 billion with a 14 per cent share, representing growth of 51 per cent and 18 per cent in 2021-22 over FY 2020-21 and FY 2019-20, respectively (Press Information Bureau, 2022). India is the third-largest producer of cotton in the world, the largest consumer of cotton after the US and China, and the second-largest producer of textiles globally. After the agricultural sector, it generates the most jobs (Dixit and Lal, 2019). India has a long history of manufacturing cotton, the country is the world's top producer of cotton yarn, with US\$ 3 billion worth of cotton yarn exported in 2019-20. However, the need for synthetic fiber is steadily growing in India. By 2030, it is predicted that India's current expected consumption of 4.4 million tons of polyester would double to 8.5 million tons, expanding at a growth rate of 8 per cent (Rajyan *et.al*, 2022).

The battle between cotton and man-made fibers takes into account sustainability as a key component. The usage of insecticides and water resources are two aspects of cotton cultivation that can have a big impact on the environment. Even though they aren't natural, man-made fibers are often produced with recycled resources and can be energy efficient.

It takes roughly 10,000 L of water to make one kilogram of cotton fabric, or about 8000 L for a pair of cotton pants, cotton consumption accounts for 2.6 per cent of total water usage globally (Ahmad *et.al*, 2021). With each passing year, it is anticipated that the fiber demand would widen even more due to rising textile consumption and population growth, as well as the limited amount of cotton produced. Man-made fibers are more resilient than cotton as they can withstand rough usage. They are easy to maintain and are wrinkle-free. They are water repellent and can be used to make water and sweat-proof clothes. Man-made fibers can be easily dyed as per the required shade. With the above background, this study aimed at comparing the growth rate and instability of cotton and man-made fibers in India.

## Methodology

Table 1: Absolute change and Relative change of cotton and man-made fiber in period I

Period I (1981-82 to 2000-01)				
	Base year	Current year	Absolute change	Relative change
Cotton	1410.53	2612.20	1201.66	85.19
Man-made fiber	92.38	887.93	795.55	861.17

The study is based on secondary data. The data on cotton production was obtained from faostat. The data on man-made fiber production is taken from the website of indiastat.com. The study period for the study is from 1981-82 to 2020-21. The data is further divided into two periods of twenty years each; Period I:1981-82 to 2000-01 and Period II: 2001-02 to 2020-21. The results were also calculated for the overall period. The following statistical tools were used in the study:

**Absolute change:** The difference between base and final values is used to calculate it. According to Singh *et al.* (2014), the absolute change for production was computed by averaging the three years of base year and the current year. The absolute change was determined using:

**Absolute change= current year- base year**

**Relative change:** This measure has been calculated to compare changes in production of cotton and man-made fiber. To determine relative change, the following formula was used:

$$\text{Relative change} = \frac{\text{current year} - \text{base year}}{\text{base year}} \times 100$$

## Compound growth rate (CAGR)

Compound growth rate was calculated by using the following formula:

$$Y_t = ab^t$$

$$\text{Compound annual growth rate (\%)} = (\text{Antilog } b - 1) \times 100$$

Where,

Y= Production in the year 't' for which the growth rate is estimated

t= Time in year

b = Regression coefficient

## Instability Index

The instability index developed by Ray (1983) is calculated as follows:

$$\text{Instability Index} = \text{Standard deviation of } \ln(Y_{t+1}/Y_t) \times 100$$

where, Y is the production of cotton and man-made fiber, t represents the current year, t+1 corresponds following year.

## Results and discussion

The results of absolute and relative change for period I are presented in Table 1. The results showed that while cotton production has increased by 1201.66 million kg in the period 1981-82 to 2000-01, man-made fiber has increased by 795.55 million kg in the same period. In relative terms, man-made fiber production has increased by 861.17 per cent while cotton production has increased by only 85.19 per cent. Between 1981-1982 and 2000-2001, there was an increase in the production of both cotton and synthetic fiber.

Table 2 presents the results of absolute and relative change for the period II. The results showed that cotton production had increased approximately tenfold in comparison to man-made fiber in absolute terms with 3280.31 million kg while man-made fiber has increased

by 331.18 million kg. Cotton production has increased by 122.49 per cent in relative terms and man-made fiber production has increased by 31.23 per cent in the period 2001-02 to 2020-21.

**Table 2: Absolute change and Relative change of cotton and man-made fiber in period II**

Period II (2001-02 to 2020-21)				
	Base year	Current year	Absolute change	Relative change
Cotton	2677.95	5958.27	3280.31	122.49
Man-made fiber	1060.15	1391.33	331.18	31.23

The results of absolute and relative change for the overall period is presented in Table 3. in the last four decades, cotton production has increased by 4547.73 million kg and man-made fiber production has

increased by 1298.95 million kg. In relative terms synthetic fiber production has increased by 1406.09 per cent while cotton production has increased by 322.41 per cent.

**Table 3: Absolute change and Relative change of cotton and man-made fiber in overall period**

Overall period (1981-82 to 2020-21)				
	Base year	Current year	Absolute change	Relative change
Cotton	1410.53	5958.27	4547.73	322.41
Man-made fiber	92.38	1391.33	1298.95	1406.09

Table 4 presents growth rate and variability in period I, period II and overall period. In the period 1981-82 to 2000-01, man-made fiber has seen a significant growth in production (14.07 per cent) while cotton production has seen a growth rate of 3.85 per cent. In period I, variability in man-made fiber production was 74.03 per cent and cotton production has a variability of 24.35 per cent. In period II, cotton production has seen a positive significant growth of 4.26 per cent while man-made fiber has seen insignificant but positive growth

rate of 0.82 per cent. In the overall period, man-made fiber has seen a significant growth rate of 7.61 per cent and cotton production has seen a significant growth of 4.39 per cent. Among the three periods, highest variability was seen in period I for man-made fiber production (74.03 per cent), followed by man-made fiber production (62.08 per cent) in the overall period. In period II, production of man-made fibers, at 14.48 per cent, showed the lowest variability.

**Table 4: Compound growth rate and coefficient of variation of cotton and man-made fiber**

	Period I (1981-82 to 2000-01)		Period II (2001-02 to 2020-21)		Overall period (1981-82 to 2020-21)	
	CAGR	CV (%)	CAGR	CV (%)	CAGR	CV (%)
Cotton	3.84**	24.35	4.26**	24.97	4.39**	50.05
Man-made fiber	14.07**	74.03	0.82	14.48	7.61**	62.08

The results of instability index are presented in Table 5. In period I, cotton showed the higher instability (14.17 per cent) as compared to man-made fibers (7.58 per cent). In period II, both cotton (12.12 per

cent) and man-made fiber (12.36 per cent) showed similar instability. In the overall period, cotton showed slightly higher instability (12.93 per cent) in comparison to man-made fiber (11.45 per cent).

**Table 5: Instability index of cotton and man-made fiber**

Instability index			
	Period I (1981-82 to 2000-01)	Period II (2001-02 to 2020-21)	Overall period (1981-82 to 2020-21)
Cotton	14.17	12.12	12.93
Man-made fiber	7.58	12.36	11.45

## Conclusion

From this study it can be concluded that man-made fibers had seen a higher percentage change in production as compared to cotton. Over the study period the growth rate for man-made fibers was higher in comparison to cotton, although the variability was higher in man-made fiber production. In India, the man-made fiber sector offers enormous prospects, and with the proper strategy, these opportunities can be successfully turned into profitable enterprises.

## Policy implications

To promote production of man-made fibers, government should provide incentives or subsidies for companies that invest in research and development of new, more sustainable man-made fibers. Support the growth of local production and supply chains for man-made fibers to reduce reliance on imports and promote economic development. Support should be provided to the local production and supply chains

for man-made fibers to reduce reliance on imports and promote economic development.

## References

1. **Dixit, P., & Lal, R. C. (2019).** Inclusive Growth and Social Responsibility-A Critical Analysis of Indian Textile Industry. *MERC Global's International Journal of Management*, 7(2), 202-210.
2. **Press Information Bureau. India's Textiles Exports highest ever in FY 2021-22**, Cross US\$ 44 Bn.2022
3. **Ahmad, H. S., Imran, M., Ahmad, F., Rukh, S., Ikram, R. M., Rafique, H. M., ... & Ali, S. (2021).** Improving water use efficiency through reduced irrigation for sustainable cotton production. *Sustainability*, 13(7), 4044.
4. **Rajyan, A., Singh, A., Chaudhary, P., (2022).** Manmade fiber industry outlook 2022. Textile value chain.

- |   |  |
|---|--|
| 5. <b>Ray, S. K. (1983).</b> An Empirical Investigation on the Nature and Causes for Growth and Instability in Indian Agriculture: 1950-80. <i>Indian Journal of Agricultural Economics</i> , 38(902-2018-1993), 459-474. | 6. <b>Singh, D. P., Dwivedi, S. C., Patel, A. K., Dhananjai, S., &amp; Akhilesh, K. (2014).</b> Absolute and relative change in area, production and productivity of different agro-climatic regions of gram ( <i>Cicer arietinum</i> ) crop in Madhya Pradesh. <i>Environment and Ecology</i> , 32(1), 191-194. |
|---|--|