



# Evaluation of Instability Aspects of Cotton Productivity in India

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## ABSTRACT

Policy decisions are often made based on the growth rates which depend on the nature and structure of the data and instability in farm production. The present paper analyzes the growth and instability in cotton area, production and productivity during the period 1951-52 to 2010-11. Growth and instability of cotton during pre-introduction (1993-94 to 2001-02) and post- introduction of Bt cotton periods (2002-03 to 2010-11) was also analyzed. For this purpose compound growth rates were estimated by studying the exponential function and coefficient of variation was worked out to find out instability associated. It was found that growth of cotton area and production was significant during 1950s, 1990s and 2001-10. Growth of cotton production was highest during the period 2001-10. Growth rate of productivity was also high during 2001-10. Instability analysis indicated that cotton area was more stable than production and productivity. Thus, policies should be made to reduce the risk in cotton production and to make it profitable so as to sustain the high growth rate experienced during the past few years.

**Keywords :** CAB, Bt Cotton, Farmer, Questionnaire , Cotton Supply , Crop

## I. INTRODUCTION

Cotton is an important commercial crop of India and plays a key role in the national economy. About 60 million people get employment either directly or indirectly in the agricultural and industrial sectors of cotton production, processing, textiles and related activities and by way exports, the foreign exchange earnings of cotton amounts Rs.3837.33 crores (CAB, 2008). With economic liberalization and globalization sweeping the world there is a scope for our country to play a leading role in the cotton production and export. It is encouraging to note that over the last few years the cotton production had shown a significant increase. In 2010-11 season, it touched a record production of 325 lakh bales with an average productivity of 496 kg/ha (Cotton Corporation of India, 2010). Majority of cotton produced in India is consumed domestically and hence, export of cotton from India is only 5.5 million bales. If this increasing production trend continues in years to come, India can become a major exporter of cotton.

Researchers have shown that with the adoption of new technologies on farmer's fields, it is possible to increase the average productivity beyond 600 kg lint per ha to meet the increasing cotton demand. Growth rates are the measures of past performance of economic variables. They are commonly used as summaries of trends in time series data. They are developed to describe the trends in a variable over time. Policy decisions are often made based on such growth rates which depend on the nature and structure of the data. Instability in farm production is causing serious shocks to supply and farm income and there is a growing concern about increased volatility in farm production, prices and farm income. Indian cotton production has undergone a metaphoric changes from 2002-03, after Bt cotton was introduced in the country, since then significant increase in area, production and yield was witnessed. Bt cotton now occupies 95% of the total cotton area in the country. These dynamic changes underline the importance of studying the growth performance and instability of cotton before and after Bt cotton introduction. Therefore the present study was

undertaken to analyze the growth and instability in cotton area, production and productivity during 1951-2010.

## 2. Growth of Area, Production And Productivity

Decadal growth rates of cotton area, production and productivity were worked out. Growth rate of cotton was negative during two decades only. But t-values indicated that this negative growth was statistically not significant. Growth rate was positive in other periods as well as overall period. Cotton area increased significantly during 1951-60, 1991-00 and 2001-10, the growth rates were 1.91, 2.21 and 3.43 percent respectively. During other periods, growth rate of cotton area was not significant. Growth rate of cotton area was positive and significant during overall period.

Cotton production during 1960-1970 witnessed significant negative growth rate whereas in 1951-60, 1991-00 and 2001-10 cotton production increased significantly. Growth of cotton production was highest during 2001-10. During overall period of analysis also cotton production increased significantly at an annual rate of 3.29 %. Cotton productivity also recorded positive growth during all the periods except during 1961-70 which has shown a negative growth rate. Among the decades showing positive growth rate all were statistically significant except the 1971-80 period. Productivity growth was highest during the last period i.e. 2001-10. During this period cotton productivity increased at a rate of 5.97% per annum, this may be due to introduction of Bt cotton. The growth rate for overall period was also positive and significant. The productivity increased at a rate of 2.94% per annum during the overall period.

## 3. Literature Review

As per Srinivasa Konduru, Fumiko Yamazaki and Mechel Paggi this paper gives the overview of the present condition of cotton harvesting and the also tell the us about the level of mechanization in cotton harvesting. In this paper the author has focused mainly on the cotton harvesting process and has given a complete comparison of the hand picking of cotton and the mechanized process of harvesting of cotton. The author has also discussed the prerequisites for application of mechanization in cotton harvesting. This

paper also deals with the implications of the mechanization process. In this paper the author and his team made discussion groups which included 7-8 farmers. The farmer were from small scale segment to large scale producers. The coordinator prepared a questionnaire and farmers are to answer them. Also there were discussions on varied topics related to cotton harvesting. They also discussed the problems faced by them in regarding to the application of mechanization techniques. Based on the data collected conclusions were made to analyze the condition of mechanized cotton harvesting and the problems faced to implement it and also the complication arising due to implementation of mechanized harvesting process.

As per Gusvinder Singh (Bayer), Asif Tanweer (Bayer), Deepak Kalbhor (John Deere). This paper gives a detailed insight into the collaborative mechanization project between the Bayer Cropscience limited, John Deere India Pvt Ltd and Bajaj Steel Industries Limited. It also tells us about the different requirements like seed requirements, distance between plants etc. to employ the mechanization in harvesting process. This paper also tells us the problems faced by the farmer in employment of mechanized process and gives the possible solution. Through this paper we also came to know about the economics related to the harvesting process. This paper also discussed the advantages of the mechanized cotton harvesting process.

As per Ambati Ravinder Raju Participatory ergonomic evaluation of cotton harvesting in rainfed and irrigated cotton of central India during 2012 found present contract manual harvesting is 30% more efficient than battery powered portable cotton picker. Higher load on contract labourer's heart was noticed with higher output of seed cotton regardless of methods of harvesting. Portable cotton pickers are high speed, precise and no need of defoliation but adequate training and willingness to adopt the machine is must. Adequately trained female and male pickers can pick 80 and 41% more seed cotton and 44% more cotton area was picked with Portable cotton picker. Portable cotton picker are more suitable for family labour of rainfed cotton harvesting with lower moisture percentage. Higher moisture content in irrigated cotton may be a hindrance for machine picking with frequent slippage. Trash content can be similar to hand harvesting (1- 2%). Present Portable cotton picker were frequently trouble shooting with improper cable

connections, entry of burs and leaves with obstruction of over grown braches.

As per S. S. Kohli, Manjeet Singh, Karun Sharma and Gayatri Kansal impact of mechanical harvesting of cotton on the profitability of Indian cotton farmers as well as its implications on cotton supply in the international markets. The results demonstrate that the net income of the cotton farmers represented from this study group will increase considerably with the mechanization of cotton harvesting. The results also show that the probability of earning a lower net income decreases, whereas, the probability of earning a higher net income increases when cotton pickers are used. The more usage of cotton pickers may lead to increase in yields and thereby increased cotton production in India, which may put a downward pressure on international cotton prices. But our observation of the conditions that are necessary for adoption of mechanical means of harvesting showed that it would take considerable period of time before Indian farmers adopt it. The findings of this study will be important for policy makers involved in improvement of Indian cotton sector as well as the livelihoods of farmers involved in cotton cultivation. Further research needs to be done to understand the efforts already put on by various public and private agencies to improve the pace of development and adoption of mechanical harvesting in India. Because when it happens, it is sure to create a major impact on international cotton markets.

As per Anuradha Narala and A.R. Reddy it is clear that during the last period and in the post- Bt period there was a significant increase in area, production and productivity and registered high growth rate. This may be due to introduction of Bt cotton in India. Instability was also high during this period indicating that cotton production increased over the periods. Although the cotton production and productivity is following an increasing trend, it is associated with many problems. Cost of production is escalating due to the rise in the prices of inputs. The prices of cotton are fluctuating from place to place and year to year making the production risky. Most of the cotton area is sown with Bt hybrids which have very high seed cost. The nutrient requirement is also high. Similarly the labor cost for cotton picking is also increasing exorbitantly. Since the Bt cotton matures early and because of synchronized bole bursting at one time the labour demand for cotton-

picking increases abruptly. Considering these facts policies should be made to Analysis of Growth and Instability of Cotton Production in India 453 reduce the risk in cotton production and to make it profitable. Programs and policies such as rehabilitation of irrigation systems, adoption of improved technologies, strengthening of extension, reducing risks in cotton production can play a vital role in achieving stability and to sustain the high growth rate experienced during the past few years.

As per Aniket S Deshmukh, Dr. Akash Mohanty Cotton Harvesters has proven to be a promising approach for cotton harvesting in India and developing countries. However challenges still remain in its implementation in India though considerable progress has been made in recent years. Developed countries have 100% mechanized cotton picking. With increasing labor charges and its unavailability, mechanization has gained pace in Indian agriculture sector. This review paper provides an overview of cotton harvesters and its various types. It also covers the anatomy of cotton plant, production, and its importance in Indian economy. Indian cropping pattern are studied in detail and various mechanism discussed and their pros and cons are evaluated in this paper.

#### **4. Cost of cotton farming**

Seed cost is the total money spent per farmer per acre in buying cotton seeds for the cotton field. Labour and machinery cost is the total money spent per farmer per acre in labour (including all events of cotton cultivation: soil preparation, sowing, spraying, manuring, weeding, picking, etc) and any machinery rental (tractor for soil preparation is the most common one). This includes only the external labour that the farmer needs to pay for. It does not include the non-financial labour supplied by the farmer and his or her family, as all farmers interviewed, and their families, supplied as much work as possible to their own farm. Family labour was not different between Bt and organic cotton farmers.

Pesticide cost is the total money spent per farmer per acre in buying chemical pesticides for cotton. Usually, Bt cotton farmers buy pesticides from the same shop where they buy Bt seeds and the shop vendors give them recommendations on what pesticides to spray.

Fertiliser cost is the total money spent per farmer per acre in buying nutrients for the cotton crop, both chemical and/or organic. Organic farmers do not use any chemical fertilisers. Organic fertilisers are applied in a variety of ways: farm yard manure, livestock temporal 'rental' in their farm, chicken manure from chicken industrial facilities and others.

Animal feed cost is the total money spent per farmer per acre in buying feed for animals. Most farmers keep some animals in their farm, both for farm work and manure supply and for milk production. In good years, farm products (e.g. straw from paddy) supply enough for feeding the animals. But in dry years, many farmers have to buy additional feed to keep their animals alive. As animals form an integral part of the cotton cultivation process, we have included this expense here.

Interest of loan cost is the total money spent per farmer per acre in paying interests from crop loans. In general, smallholding farmers are very cash limited and need to take a loan every year in order to buy farm inputs at the beginning of the season. Only some farmers are able to take bank loans at official rates. Many can only rely on moneylenders from their village, who normally charge interest up to 50% per year. Some farmers are associated with self-help groups and societies (sangam) that facilitate microcredits at much lower rates.

Total cost of cotton farming is the sum of all these expenses. Each variable was calculated for every farmer and then averaged across Bt and organic cotton farmers. All figures are given in Rupees (Rs) per acre (a). As we want to keep this study meaningful for farmers, we have kept the unit system used by farmers in India (i.e. acres instead of hectares and quintals instead of kilograms or tonnes)<sup>7</sup>. Conversions are given in the footnotes of the Results section.

## 5. Survey on Cotton Harvesting In Saoner

The purpose of this survey was to analyse the present level of mechanisation in cotton harvesting in the following region. The test was performed to get the present system of production, yield and harvesting techniques. Also the purpose was to analyse the actual cost required in this process of cotton harvesting. In this survey we tried to meet with as much farmers as we can and collect relevant data. A wide range of questions

were asked to understand the present scenarios. Also we came to know the reasons why the mechanisation in cotton harvesting india in at very low level.

Mechanization in the region surveyed was 0% i.e. No mechanization was present in the area for cotton harvesting. The reasons behind were firstly the cost of the machine which according to the farmer did not yield any increase in the output. The farmer argued that in one day a labour can pick around 30-50 kg of cotton on an average in a day i.e. in 7 hours, depending on their capacity so if they employ mechanized pickers then it should at least pick 100kg in a day then only it will be possible for them to employ it. They pay a labour 150-300 rupees per day (women are paid 150 rupees and men are paid 300 rupees a day) who pick 50kg of cotton each. If they employ machine for picking and if it picks around 50-60kg then there is no profit to them as they have to pay for machine and its maintenance and also the operator which will cost them more. And also while picking through machine there is trash content in the cotton which fetches them less money on sale. So until the efficiency of the machine is increased and the problem of trash content is solved it is not feasible for them to employ the mechanized processes.

Farmers also said that employment of machine is done when the area is very large. Small scale producers who have 10 -15 acre of land prefer hand picking but the large scale producers who have area of about 50-60 acre or above hand picking becomes cumbersome and also the advanced machine presently are available for the large areas which are very efficient and trash content is also very low.

According to the farmers the present portable pickers are not efficient and attract large amount of trash content which is a very huge problem. The farmers said that if a portable machine with good efficiency and which attracts very less trash content is available they will be ready to use it as it will profit them largely.

## II. CONCLUSION

Studies clearly show that non-Bt organic farmers, by engaging in economic and ecological farming, and by diversifying their cropping system and relying more on their community, achieved a better, more secure economic livelihood than Bt cotton farmers. Bt cotton

farmers, with very high cost of cultivation, high-chemical low-diversity farming, and high debt, are under high vulnerability and risk of household financial collapse. In an era of growing risk and uncertainty, the high variability in the performance of Bt cotton, even when looking at only two years, represents in itself a threat to the livelihood of these small-scale farmers. In an unfavourable year, Bt farmers made only a quarter of the income they could expect in a normal year, while organic farmers' income only decreased by half. This inherent variability resulting from the non-adaptable Bt technology, added to the background of high debt and unpredictable weather, clearly endangers the subsistence of the rain-fed smallholding cotton farmers in India. It seems clear that single technological interventions are a narrow, expensive and ineffective approach to solve any aspect of the profound problems that India and other developing countries are facing in the context of diverse and complex farming systems.

### III. REFERENCES

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