

Environmental Sustainability Challenges in Cotton Value Chain *How is India Responding to these Challenges?*

Purna Chandra Jena*

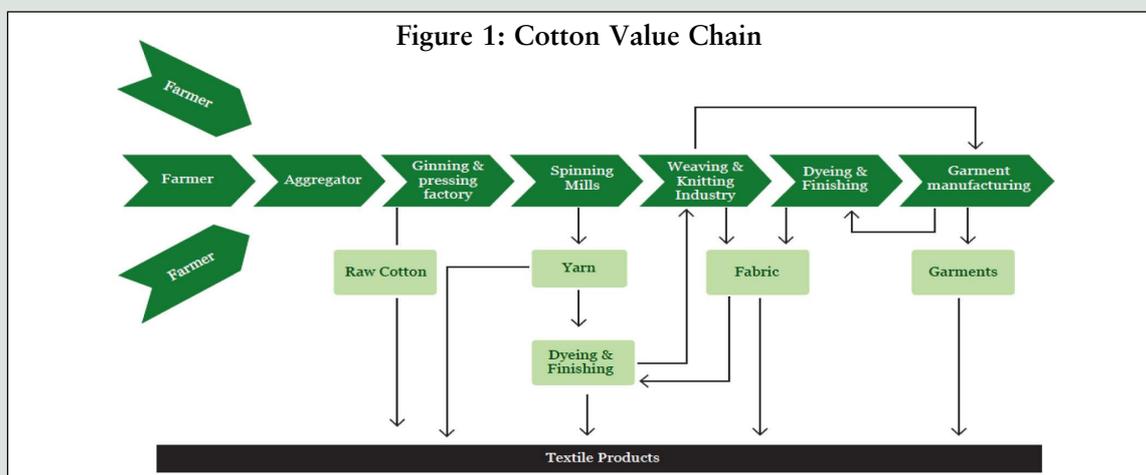
Promotion of environmentally-sustainable agriculture, in general, and cotton, in particular has emerged as a major policy concern globally. The entire spectrum of activities from cotton production, leading up to consumption, is no exception to this global trend. An assessment of the cotton value chain reveals a mix of economic and environmental factors which need policy attention. Against this backdrop, this Briefing Paper has tried to shed light on the role of Indian government policy and regulatory framework spanning mid-80s till now, to ensure delivery of better and sustainable cotton production and consumption along the value chain.

Introduction

Promotion of environmentally-sustainable agriculture has emerged as a major policy concern globally. The entire spectrum of activities from cotton production leading up to consumption is no exception to this global trend. An assessment of the cotton value chain (Figure 1) reveals a mix of economic and environmental factors which need policy attention. On the economic side, the issues mainly related to inefficiency of the production process include choice of seeds, harvesting techniques and inefficiencies arising on account of post-harvest storage and

transportation. On the environmental sustainability dimension, a number of factors mainly relate to the form of trash content as well as unsustainable use of inputs, such as water, pesticides and fertilisers.

Against this backdrop, accelerated demand for cotton, globally, has led to more than threefold increase in its production since 1950s.¹ This increase in production has been achieved through intense input application, use of which has most often overlooked environmental impact. Some of these unsustainable production practices include indiscriminate use of pesticides and fertilisers,



* Assistant Policy Analyst, CUTS International (pcj@cuts.org)

extensive use of irrigated water, with no regard to water quantity and quality, use of applications that contribute to soil erosion, and an imbalanced (quantity, time of use) use of resources in some areas.²

The environmental impact associated with cotton production, such as soil and water pollution, are increasingly coming into focus and reiterating the need for sustainable production systems. The United Nations defines ‘Sustainable Development’ as development that meets the needs of the present, without compromising the ability of future generations to meet their own needs.³ The basic premise of this definition is supported by three pillars of sustainable development – economic sustainability, environmental protection, and social security.

Sustainability in cotton production and consumption is critical for ensuring sustainable livelihoods of Indian farmers and also for upstream industrial activities which depend on them directly or indirectly. Several countries have tried to create trade-related disincentives to unsustainable cotton production and consumption practices: The EU’s standards and labelling on cotton textile is one example.

Environmental Issues in the Cotton Sector

There are various environmental and economic issues which are besetting the current structure of cotton production and consumption and they need to be addressed. On the economic side, the issues mainly relate to inefficiency of the production process including choice of seeds, harvesting techniques and inefficiencies arising on account of post-harvest storage and transportation. On the environmental sustainability dimension, a number of factors

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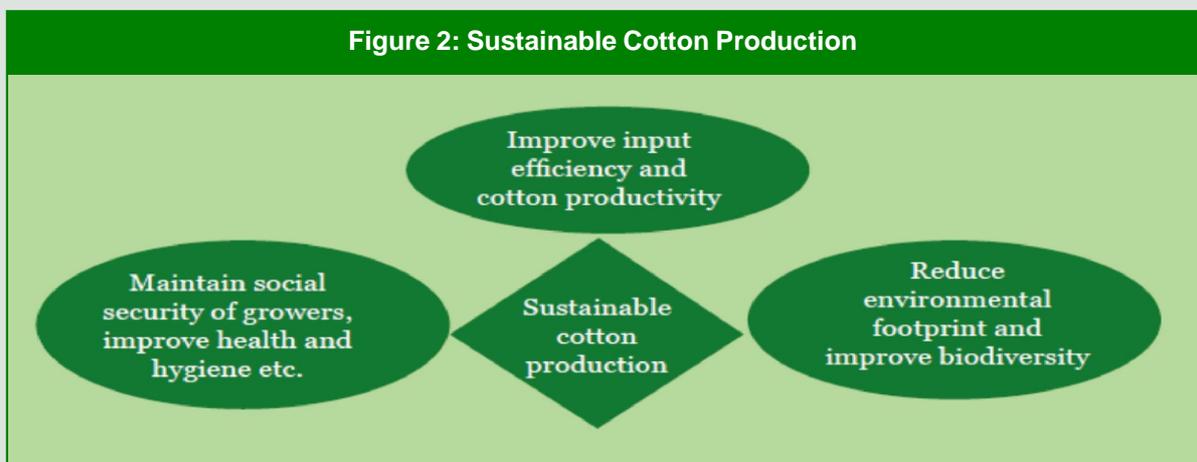
Figure 2 reflects some major issues that disturb the balance in the production of cotton along the value chain. However, a proper and effective framework initiative needs to be under taken to reduce the ill effects of the following issues, such as excessive use of chemical fertilisers and pesticides, surface run off and agricultural pollution, water contamination, environmental impact of irrigation systems, increased soil salinity, loss of biodiversity, and increasing carbon emissions among others. The impact coming from the production and consumption practices of cotton along the supply chain is being highlighted in Box 1.

How is India Responding to these Challenges?

The universe of regulatory framework governing cotton production and consumption is India’s agricultural policy, in general, and textile sector policy, in particular. A number of important initiatives promoting sustainable cotton cultivation and use have also been put in place by the farmers, CSOs, national and international organisations. The global regulatory framework and shifting demands towards organic cotton has also contributed to the introduction of changes in the cotton value chain.

Government Policy

Various policies and regulations have been initiated to address unsustainable production practices in the agriculture sector. However, there is neither direct crop-specific policies to cotton



Source: Cotton market and sustainability in India, WWF India and Yes Bank, 2012

Box 1: Ecological and Social Impact of Cotton Production and Uses

Stages of production and use	Source of ecological impact		Source of social impact	
	High	Medium/Low	High	Medium/Low
Fibre production	<ul style="list-style-type: none"> • Intensive of pesticides, fertilisers and other chemicals • Destruction of soils' self-regeneration capacity • Disturbance in soils' water balance, and contamination of water sources 	—	<ul style="list-style-type: none"> • Adverse impact of pesticides and chemicals use on human health • Increased financial dependence on companies producing pesticides and other chemicals • Volatility in cotton prices/market 	—
Spinning	—	Energy intensity	—	—
Fabric production	—	Energy intensity	—	—
Dying/finishing	<ul style="list-style-type: none"> • Toxicity of chemicals (dyestuff and additives) • Pollution of waste water and insufficient degradability • Use of formaldehyde and heavy metals • Water and energy consumption 	—	—	Impact on human health
Clothing production	—	Materials wastes	<ul style="list-style-type: none"> • Issue of labour conditions • Issue of minimum wages • Issue of child labour 	—

Source: Authors compilation from various online sources

production and consumption, nor these policies are sufficient to maintain sustainability completely in India. But, promotion of sustainable cultivation of cotton and its use comes under various initiatives. For example, in 2000, the Government of India announced the National Textile Policy – 2000 (NTP 2000), which replaced the previous Textile Policy of 1985. One of the main objectives of the new policy is to enable the textile industry to attain and sustain a pre-eminent global standing in manufacture and export of clothing.

The Technology Mission on Cotton

The Technology Mission on Cotton (TMC) was launched on February 21, 2000 by the Government of India and is continuing till now with five distinct goals. It comprises of five Mini Missions (MM) and is organised by the Ministry of Agriculture and the Ministry of Textiles. The specific objectives of the Mission include: (i) increase the productivity per hectare of cotton, (ii) development of new technologies and varieties, (iii) transfer of new technology and financial assistance to the farmers, (iv) improvement in

marketing infrastructure, and (v) improvement in the seed cotton (kapas) processing for reducing contamination.

The TMC has inbuilt characteristics to promote and to realise distinctive improvements in production and processing of cotton. It has set standards for various activities during processing and use of cotton. For example, for ginning and pressing it has set standards for ginning machines, pre-cleaner and lint cleaner practices, kapas and lint conveyor systems, bale press, conveyor for seed, humidifier/moisturiser, firefighting system, underground wiring and others, as indicated in the box above.

MM-I reveals that planting of cotton on flat beds and opening of ridges and furrows at last inter-cultural operation has increased the productivity to the tune of 18 percent over farmers' practice of sowing of cotton on flat beds without opening of ridges and furrows. In Central zone, it has been observed that on an average 16 percent more yields can be achieved by adopting Integrated Nutrient Management (INM) model. In South zone, INM model increases the productivity by 22 percent over farmers' practice, whereas, MM-II led to positive impact on yields and

productivity. In addition, the use of pesticides has also come down. As a result of MMs, the pesticides consumption has been reduced by more than 30-40 percent especially in the States of Andhra Pradesh, Haryana, Maharashtra, Gujarat and Tamil Nadu.

Similarly, in case of MM-III and MM-IV, impressive results are observed. By providing the required infrastructure in markets, the sources of contamination are being effectively plugged. Setting up of grading laboratory enables the farmer to get a price commensurate with cotton quality. Farmers' Information Centres (FICs) provide information for better crop management and price realisation by which the profitability of cotton cultivation has improved. Against these backdrops, MM-V has direct impact on the textile growth of the country in recent years.

Regulations to Control Use of Hazardous Inputs

There are various initiatives and regulations undertaken by the Government of India to control use of hazardous inputs along value chain of cotton. For example, at the production stage, use of chemicals is guided by the Environment (Protection) Act, 1986 and the National Environment Policy 2006. Under these two (EPA 1986 and NEP 2006), the Ministry of Environment & Forests has notified the rules for the manufacture, use, import, export and storage of hazardous microorganisms/genetically engineered organisms under the Environment (Protection) Act, 1986.

These rules and regulations cover the areas of research as well as large scale applications of genetically modified organisms and products made there from throughout India. The rules also cover the application of hazardous microorganisms which may not be genetically modified. The target substances covered are, besides the hazardous natural microorganisms, all genetically engineered organisms including microorganisms, plants and animals. The Rules mandate risk assessment and regulatory approval for every proposed release of GMOs or GM products.

Considering that chemical use in the form of pesticides, herbicides, insecticides among others create enormous environmental hazards, government of India started regulating its use many years back. Approval to transgenic Bt. cotton by the Genetic Engineering Approval Committee was one such attempt and was

premised on the fact that it will lead to reduced use of pesticides in cotton production. The government followed a policy of case by case approval of transgenic crops. Bt. Cotton was the first and only transgenic crop approved by GEAC for commercial cultivation in six states namely Andhra Pradesh, Gujarat, Karnataka, Madhya Pradesh, Maharashtra and Tamil Nadu. This has now extended to cover all the cotton producing states in India.

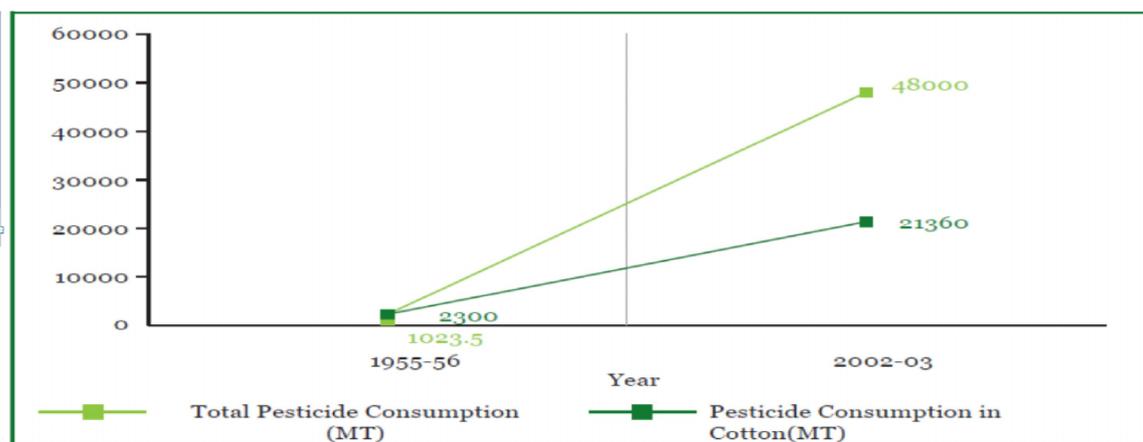
In addition, it might be recalled that in 1997, the Government of India banned the use of hexachlorocyclohexane (HCH), which accounted for about 30 percent of total pesticide consumption. In the same decade, subsidies for insecticides were also abolished.

The use of harmful insecticides is also monitored and controlled. This is based on the Insecticides Act, 1968, Ministry of Agriculture, Department of Agriculture & Cooperation (DAC) that regulates the import, manufacture, sale, transportation, distribution, and use of insecticides with a view to preventing risks to humans or animals, and for matters connected therewith. Accordingly, the government has banned the use of more than 30 pesticides, restricted the use of seven pesticides including DDT, and refused registration for 18 pesticides.

To provide a more effective regulatory framework for the introduction and use of pesticides in the country, the government amended the Pesticides Management Bill, 2008, which replaced the Insecticides Act, 1968. In addition, a campaign to prevent the manufacture and sale of spurious pesticides was launched by the DAC in cooperation with all the state governments and the respective Central Integrated Pest Management Centre (CIPMC). The quality of pesticides is monitored by the central and state insecticide inspectors, who draw samples of insecticides from the market for analysis.

As a result of various measures and policy initiatives by the Government of India, consumption of chemical pesticides has been reduced and use of bio-pesticides has increased as better replacement. Consumption of chemical pesticides has reduced from 65,462 MT during 1994-95 to 47,020 MT during 2001-02. In later years, the overall consumption of pesticides in agriculture shows significant variations. However, during 1955-56 and 2002-03, pesticides use in cotton farming has substantial share in total pesticides use in agricultural sector (Figure 3).

Figure 3: Change in Total Pesticide Consumption in Respect to Total Pesticide Consumption (MT) in Cotton



Source: Cotton market and sustainability in India, WWF India and Yes Bank, 2012

Other Important Government Initiatives

In addition to the above initiatives, the Government of India has taken various other initiatives as well to promote sustainable production in the cotton sector.

Integrated Crop Management (ICM) and Integrated Pest Management (IPM) are some of the government initiatives through which sustainable production practices can be promoted. ICM is a concept that balances the three dimensions of sustainability and sets a framework of good agricultural practices. These comprise a wide portfolio of measures such as soil and nutrient management, seed choice and pest control. IPM includes indirect measures for weed, insect and disease prevention, crop rotation, and direct control measures through biological, biotechnological, chemical and mechanical means. The combination of breeding and crop protection

research provides tools to manage weeds, pests and diseases in an integrated way.

One of the very important recent developments (July 2012) in India is the introduction of national standards for organic textiles. The Indian Standards for Organic Textiles (ISOT) is introduced in the National Standards for Organic Production (NPOP) and is administered by the Commerce and Industry Ministry as part of the Foreign Trade Policy. It may be recalled that there are over 1,000 branded organic products produced in India and each one is backed up with certification and traceability.

Initiatives have also been taken to control the use of chemicals and address other sustainability issues. Towards this, the Government of India had also taken steps to ensure production of eco-safe textiles in the country. More specifically, following steps have been taken by the Government of India (Box 2).

Box.2: Steps to Produce Eco-friendly Products

- The ban of 70 carcinogenic dyes in textile applications
- The Bureau of Indian Standards has launched the ecolabelling scheme. It permits to use "Eco-Mark" label on textile processed with safe chemicals
- Setting up of a chain of eco-testing laboratories in all textile production centers in the country
- To encourage textile industry to invest in effluents treatment plants, Technology Upgradation Fund scheme has been launched
- Financial assistance for setting up common effluent treatment plants to benefit small processing units (Roy, 2006)

Other Initiatives for Sustainable Cotton Production

Organic Cotton

Organic initiatives were introduced to cotton in the 1990s. Organic cotton production offers a strong alternative to current conventional production methods. To date, 100,000 farmers around the globe profit from organic cotton production. Organic cotton certification focuses on the farming system and environmental sustainability. It has a market share of little less than 0.2 percent today and the area under organic cotton cultivation is close to 0.76 percent of the total cotton production. In 2008-09, 175,000 tonnes of organic cotton were produced, as against the total cotton production of 23.4 million tonnes. India is one of the leading producers of organic cotton in the world.

The main differences between conventional cotton and organic cotton relate to the methods of cultivation. During the cultivation of organic cotton, the use of synthetic pesticides and fertilisers is not allowed, neither is the use of biotech cotton seeds. The objective of these rules is to maintain a healthy environment. These growing methods aim to minimise negative influences on biodiversity and, at the same time, maintain the good quality of the farmland, lakes, and rivers. Crop rotation and the use of animal or vegetable fertilisers are also requested in organic cotton production. Useful insects, as well as biological pest and weed controls, such as pheromone traps, are used, in addition to weeding by hand.

One of the challenges faced by organic cotton farmers is to go through a 2 to 3 year period of transition. During this period, although the producer is already required to apply the organic standards, which are more labour intensive than in conventional cultivation, transitional cotton is not allowed to be sold as certified organic.

Better Cotton Initiative

Better Cotton Initiative (BCI) is a voluntary programme, with a vision to educate millions of farmers around the world to grow cotton in a way that is healthier for the farming communities and the environment, and is more economical.⁴

The standards developed by BCI tend to take a moderate approach towards sustainable cotton. The purpose of the standard is to transform the market by bridging the gap between unsustainable cotton and organic cotton. The production process is manageable by farmers, and not governed by stringent protocols. It is meant to exclude unacceptable and reduce the gap between the best and conventional practices, in order to achieve faster market transformation instead of proceeding incrementally.

In addition to the above initiatives, some private players have also shown active participation in the direction of sustainable cotton production. For example, Abhishek Industries Ltd, Arvind Limited and Ingvar Kamprad Elmtaryd Agunnaryd (IKEA) are active in India for better and sustainable cotton production and consumption.

Box 3: Stakeholders' Commitments to Better Cotton Initiative (BCI) by Some Companies in India

Company	Commitments
Abhishek Industries Ltd.	AIL has made a commitment towards ethical business. AIL has partnered with BCI to promote measurable improvements in cotton cultivation to make it more economically, environmentally, and socially sustainable
Arvind Limited	Arvind initiated the first BCI approved project in India and is a newly elected member of BCI council. Arvind's project covers over 30,000 acres of farmlands and involves working closely with nearly 3,800 farmers. The project size is set to double within the next financial year.
IKEA	Founding member of BCI. IKEA and WWF started working with farmers in India in 2005 with the aim of making conventional cotton production more sustainable. As of now, 13.4 percent of their total cotton use is sustainable cotton.

Source: Cotton market and sustainability in India, WWF India and Yes Bank, 2012

Conclusions and Recommendations

Environment impact coming from the production and consumption of cotton are the most contested issues in the limelight now. However, governments and other stakeholders (who are associated with this sector) all over the world, have taken various initiatives to supplement a sustainable practice in cotton production and consumption, yet more needs to be done in this regard.

In this context, following initiatives are needed for maintaining sustainability in cotton in the sphere of environmental, social and economic activities:

Firstly, to improve ground level situation, there is a need for capacity building of farmers, especially small and marginal farmers to help them to convert their knowledge on sustainable practices to ground action, through appropriate economic initiatives and awareness programmes.

Secondly, formal phasing out of toxic chemicals associated with cotton production and textile processing through stringent monitoring and regulation at the regional and sub-regional levels are required. Current production practices such as indigenous knowledge and focus on building soil biological productivity, non-pesticide management; organic soil management, community seed banks, soil moisture management, etc., have already proven to be useful. These

should be further promoted and existing initiatives should be strengthened.

Thirdly, development and wider dissemination of more efficient and environmental-friendly cotton technologies are required to meet growing demands of sustainability standards in the international market.

Fourthly, partnership between various governmental and non-governmental agencies at the district level could be created to implement programs. An alliance of public sector research organisations, extension agencies, departments dealing with rural livelihoods and farmers groups and CSOs at the national level should be formed and engage on sustainable agriculture/organic/natural/ecological farming.

Finally, policy initiatives are required to integrate the environmental and social impact into the economic value of cotton; else cotton productivity will deteriorate in the long run. It is crucial that Better Management Practices (BMPs) that include IWM, IPM and INM, at the very least are integrated in India's overall cotton production. As an integral part of cotton cultivation in India, these practices will encourage conservation of natural resources, enhance soil fertility, encourage water management, discourage the use of pesticides and other harmful chemicals, and reduce the overall water and carbon footprint of cotton (WWF, 2012).

Endnotes

- 1 Cotton market and sustainability in India, WWF India and Yes Bank, 2012
- 2 The per hectare pesticide consumption for cotton amounts to 2.7 kg/ha, which is much higher than national average of 0.8 kg/ha¹². Interestingly, it is estimated that only 0.1% of these chemicals used reach the targeted pests, with 99.9 percent dispersing into the soil, water, and air (Myers, 1999).
- 3 Report of the World Commission on Environment and Development
- 4 www.bettercotton.com

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