

WORLD COTTON DAY CELEBRATIONS 2025

coinciding with
4th Global Cotton Conference

Theme:
**Cotton 2040:
Technology, Climate
& Competitiveness!**

Knowledge Paper



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Foreword



Cotton has long been the cornerstone of India's textile heritage, sustaining millions of livelihoods and anchoring our global reputation in natural fibre production. Yet, as we look toward 2040, the cotton sector must evolve to meet the demands of a rapidly changing world—one shaped by technological disruption, climate volatility, and intensifying global competition.

This white paper, themed *"Cotton 2040: Shaping the Future Through Technology, Climate Resilience, and Global Competitiveness"*, offers a forward-looking perspective on how India can reimagine its cotton value chain. It explores transformative innovations—from precision agriculture and biotech advancements to circular economy models and digital traceability—that can drive productivity, sustainability, and equity across the sector.

We extend our sincere thanks to the Indian Chamber of Food and Agriculture (ICFA) for partnering with CITI to prepare this insightful and timely paper. Their rigorous analysis and strategic vision provide a powerful foundation for industry stakeholders, policymakers, and innovators to collaborate in shaping a resilient and future-ready cotton ecosystem.

Confederation of Indian Textile Industry (CITI) is proud to present this knowledge resource as part of our commitment to fostering leadership, sustainability, and inclusive growth in India's textile journey. We invite all stakeholders to engage with its findings and contribute to building a cotton sector that thrives in 2040 and beyond.

Thank You,

Mr. Ashwin Chandran

Chairman

Confederation of Indian Textile Industry

Foreword



Cotton is more than a crop—it is a cultural legacy, an economic engine, and a symbol of India’s agricultural and industrial strength. As we look ahead to 2040, the cotton sector must embrace a new paradigm—one driven by technology, climate resilience, and global competitiveness.

This white paper is a strategic effort to chart India’s path forward. It brings together insights from across the cotton value chain, highlighting the urgent need for innovation in farming practices, sustainable resource management, and advanced textile manufacturing. It also underscores the importance of policy alignment, investment in R&D, and global market integration to secure India’s leadership in the cotton economy.

We at the Indian Chamber of Food and Agriculture (ICFA) are proud to have prepared this knowledge paper in collaboration with the Confederation of Indian Textile Industry (CITI). We believe that this document will serve as a catalyst for dialogue, action, and transformation—empowering stakeholders to build a future-ready cotton ecosystem that is productive, inclusive, and environmentally sustainable.

Let this be a call to action for all—farmers, industry leaders, policymakers, and innovators—to shape the future of cotton with vision, courage, and collaboration.

Thank You,

Suresh Prabhu

Chairman

Indian Chamber of Food and Agriculture

1. Executive Summary

The global cotton industry stands at a pivotal juncture, facing unprecedented challenges and opportunities as it moves toward 2040. This knowledge paper examines how three transformative forces— technological innovation, climate change, and global competitiveness will reshape the future of cotton production, trade, and sustainability. With rising climate risks, evolving consumer demands, and rapid advancements in agricultural technology, stakeholders across the value chain must adapt to remain resilient and relevant. Drawing on data-driven analysis, case studies, and future scenarios, this paper provides actionable insights for farmers, industry leaders, and policymakers to build a climate-smart, tech-enabled, and globally competitive cotton ecosystem.

2. Introduction: Cotton at a Crossroads

Cotton, often described as the “white gold,” is one of the most important commercial crops in the world. It sustains entire textile value chains and provides livelihoods for millions of farmers and workers. India cultivates over 11.4 million hectares of cotton, the largest area under the crop globally, engaging more than six million farmers and providing employment to nearly 50 million people in cotton processing and trade. Cotton alone contributes 59% of the raw material to India’s textile industry, accounts for about 56% of India’s total Textile & Apparel exports, and represents 4.9% of agricultural output value.¹ Beyond its economic significance, cotton represents both an agricultural mainstay and an industrial cornerstone. Its cultivation spans diverse agroclimatic zones, offering resilience in regions with limited crop alternatives, while simultaneously supporting large-scale employment in ginning, spinning, and apparel manufacturing. In India, this dual role is particularly evident, as cotton sustains millions of smallholder farmers while anchoring the textile sector’s integration into global value chains. At the same time, the sector remains vulnerable to climate variability, pest outbreaks, and global trade fluctuations, underscoring the need to view cotton not only as a crop but also as a strategic driver of rural livelihoods, export competitiveness, and sustainable growth.

Cotton accounts for 31% of global textile fibre use and supports the livelihoods of over 350 million people worldwide. However, the industry is increasingly vulnerable to climate disruptions, rising input costs, and shifting consumer expectations. The next two decades will demand bold adaptation and innovation to ensure cotton remains viable, sustainable, and equitable.

Technological innovation is revolutionizing the cotton industry, offering tools to enhance productivity, reduce environmental impact, and improve transparency across the value chain. By 2040, these advancements will be central to building a resilient and competitive cotton ecosystem.

¹ (Source: According to the ICAR–All India Coordinated Research Project (AICRP) Annual Report 2024–25) and CITI analysis based on DGCI&S data.

3. From Farm to Fashion: How Smart Cotton Fuels Textile Growth

A climate-smart, tech-enabled, and globally competitive cotton ecosystem directly strengthens the textile industry in several transformative ways:

3.1 Environmental Sustainability

Environmental sustainability in cotton farming is being revolutionized through organic and climate-smart practices that significantly reduce environmental impact. Techniques such as rain-fed irrigation, minimized fertilizer use, and the adoption of heat-tolerant germplasm help lower greenhouse gas emissions and conserve water resources. These innovations not only protect ecosystems but also produce cleaner, high-quality cotton that serves as a vital input for green textiles. By aligning with global demand for eco-friendly fabrics, sustainable cotton supports India's broader commitment to achieving net-zero emissions and positions its textile industry as a leader in responsible production.

Case Study: Zameen Organics, a farmer-owned initiative in western India, exemplifies how sustainable cotton farming can power the textile industry's shift toward ethical and eco-friendly production. By eliminating synthetic inputs and adopting rainfed irrigation and crop rotation, Zameen ensures organic cotton cultivation that preserves soil health and reduces environmental impact. This cotton, certified by global standards like GOTS and Fairtrade, is highly sought after by international textile brands aiming to meet sustainability goals. Through traceable and ethically sourced cotton, Zameen not only empowers local farmers but also strengthens India's position in premium textile markets, aligning agriculture with global fashion trends and responsible supply chains.

3.2 Innovation & Investment

Smart Fabrics & Green Textiles: Innovation and investment in sustainable cotton farming are catalysing a new era for India's textile industry, driven by tech-enabled agriculture and strategic policy support. Cotton cultivated through precision farming using IoT sensors, satellite imaging, and AI-based crop monitoring ensures consistent quality and traceability, which are essential for developing smart fabrics and organic textile blends. These innovations have attracted significant R&D funding, with India's technical textiles market alone projected to reach \$40-50 billion by 2025 (Source: 6th edition of the National Conclave on Standards and Regulations for Technical Textiles, jointly organized by FICCI, BIS, and the Ministry of Textiles, July 2023).

On the policy front, initiatives like the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) have subsidized drip irrigation systems, improving water efficiency by up to 50% and enabling farmers to adopt climate-resilient practices.

According to a press release dated March 27, 2025, the Ministry of Textiles launched the National Technical Textiles Mission (NTTM) in 2020 with a total outlay of ₹1,480 crore, aimed at boosting innovation, research, exports, and skill development in the technical textiles sector. The mission is structured around four key components: R&D, market promotion, export enhancement, and education/training, and is set to run until 2025–26. This convergence of technology and policy is creating a robust farm-to-fabric ecosystem, positioning India as a hub for sustainable textile manufacturing and attracting both domestic and foreign investment into the sector.

Case Study: Kala Cotton, cultivated in the arid region of Kachchh, Gujarat, exemplifies how indigenous cotton farming can fuel innovation in smart fabrics and green textiles. This genetically pure, rainfed cotton variety thrives without synthetic inputs, making it naturally organic and climate resilient. Its coarse yet durable fibre is ideal for eco-friendly textiles and is increasingly being explored for smart fabric applications due to its strength and sustainability. Processed using traditional methods like hand spinning and natural dyeing, Kala Cotton minimizes water and chemical usage, aligning perfectly with global sustainability standards. Fashion brands in India and abroad are integrating Kala Cotton into their collections, showcasing how local innovation can meet international demand for ethical and traceable textiles. This model not only revives traditional farming but also strengthens India's position in the premium textile market through a fusion of heritage and technology.

4. Technology as a Catalyst for Transformative and Emerging Innovations: Driving Smart Cotton Farming

Technology as a Catalyst for Transformative and Emerging Innovations: Driving Smart Cotton Farming. These innovations not only optimize resource use and improve fibre quality but also empower large & small farmers with data-driven decision-making. As India and other cotton-producing nations embrace these advancements, the sector is poised to become more climate-resilient, globally competitive, and aligned with the evolving demands of the textile industry.

- **Precision Agriculture** driven by AI and sensor technologies, enables farmers to optimize irrigation, forecast yields, and manage pests with greater accuracy, monitor crop health reducing input costs and environmental impact.
- **Biotech Advancements** are producing drought-resistant and genetically engineered pest-tolerant cotton varieties, crucial for regions facing climate stress.
- **Blockchain & Traceability** is revolutionizing supply chain traceability, allowing for verified ethical sourcing and real-time tracking by creating immutable records of cotton's journey from farm to fabric. This is increasingly important as global buyers demand traceable and responsibly sourced cotton.

- **Automation** is reshaping labour-intensive processes in cotton farming and processing through robotics in harvesting and ginning is addressing labour shortages and improving operational efficiency.

Smart cotton farming in India is rapidly transforming traditional agriculture into a tech-enabled, climate-resilient system that benefits both farmers and the textile industry. A notable example is the work led by ICAR–Central Institute for Cotton Research (CICR) in Sirsa, Haryana, where farmers have adopted drip irrigation, mulching, raised beds, and heat-tolerant cotton varieties to combat rising temperatures and water scarcity. These practices, supported by government schemes like PMKSY and NICRA, have improved soil health, stabilized yields, and reduced input costs. Simultaneously, smallholder farmers across India are embracing mobile-based advisory platforms and low-cost sensor kits from startups like Farmonaut, which offer satellite-based crop monitoring, real-time pest alerts, and customized agronomic advice. These innovations have led to a 25–40% reduction in pesticide use, improved fibre quality, and increased profitability. Together, these smart farming practices are laying the foundation for a more sustainable cotton supply chain, aligned with the textile industry's push for ethical sourcing and global competitiveness.

5. Climate Change — Building Resilience in Cotton Cultivation

Climate Risks

Climate change poses a significant threat to the global cotton industry, with mounting risks that could severely impact production and livelihoods. By 2040, nearly 50% of cotton-growing regions are expected to face high climate risk exposure, making them increasingly vulnerable to environmental disruptions. Rising temperatures will intensify heat stress across 75% of these areas, affecting crop growth, fiber quality, and harvest cycles. In addition, water scarcity, prolonged droughts, and extreme weather events such as floods and storms are projected to become more frequent and severe, threatening yields and destabilizing supply chains. These challenges underscore the urgent need for climate-resilient farming practices, adaptive technologies, and coordinated policy responses to safeguard the future of cotton cultivation.

Adaptation Strategies:

To safeguard the future of cotton production amid escalating climate risks, adaptation strategies must be prioritized across the value chain. Regenerative agriculture and carbon farming offer powerful solutions by restoring soil health, enhancing biodiversity, and capturing at-

atmospheric carbon, thereby improving long-term productivity and environmental resilience. The development and deployment of climate-resilient seed varieties engineered to withstand drought, heat stress, and pest pressures are essential for maintaining yields in increasingly volatile growing conditions. Additionally, diversifying cropping systems by integrating cotton with complementary crops can reduce dependency on single harvests, improve soil fertility, and buffer against market and climate shocks. Together, these strategies form a robust foundation for a climate-smart cotton industry by 2040.

Adaptive strategies are essential to future-proof cotton cultivation against escalating climate challenges. The development and adoption of climate-resilient cotton varieties particularly those with short growth durations and drought tolerance, enable farmers to maintain yields even under erratic weather conditions and limited water availability. Regenerative agricultural practices such as cover cropping, carbon farming, and no-till methods restore soil health, enhance biodiversity, and sequester carbon, contributing to both environmental sustainability and long-term productivity. Equally vital is water stewardship, where techniques like drip irrigation and rainwater harvesting optimize water use, reduce dependency on unpredictable rainfall, and ensure efficient resource management. Together, these strategies form a robust framework for building a resilient, climate-smart cotton industry by 2040.

Actionable Insights

- **Farmers** play a pivotal role by embracing climate-smart agronomy such as precision irrigation, drought-tolerant seed varieties, and integrated pest management to enhance resilience and reduce input costs. Diversifying income through intercropping with legumes, oilseeds, or vegetables not only improves soil health but also buffers against market volatility and crop failure.
- **Industry leaders** must actively support regenerative sourcing by investing in supply chains that prioritize soil restoration, biodiversity, and low-emission farming. Participation in carbon offset programs can help mitigate environmental impact while aligning with global sustainability standards and consumer expectations.
- **Policymakers** are essential in creating enabling environments offering carbon credits to reward sustainable practices, designing crop insurance schemes that protect farmers from climate shocks, and funding infrastructure for water conservation and digital agriculture.

Together, these insights form a roadmap for building a resilient, inclusive, and climate-smart cotton ecosystem by 2040.

6. Global Competitiveness — Positioning India as a Cotton Leader

The global cotton industry is undergoing a significant shift, driven by evolving economic and environmental pressures. Rising input costs (fertilizers, energy, transport) are squeezing margins—One of the most pressing challenges is the rising cost of inputs fertilizers, energy, and transportation which are steadily eroding profit margins for producers. Volatile fuel prices and supply chain disruptions have further compounded operational costs, making efficiency and resource optimization critical for survival.

Trade flows are shifting toward low-cost, climate-favourable regions. Simultaneously, global trade flows are realigning, favouring countries with lower production costs and more climate-favourable conditions. Nations like Brazil and parts of Sub-Saharan Africa are emerging as competitive hubs due to their ability to produce high-quality cotton with fewer climate constraints and lower overheads.

In this changing landscape, ethical sourcing and sustainability have evolved from niche concerns to mainstream trade differentiators. Buyers and brands are increasingly prioritizing cotton that is traceable, responsibly grown, and certified under standards like Organic, Better Cotton, or Fairtrade. This shift is not only reshaping procurement strategies but also influencing consumer behaviour, compelling producers to align with global expectations around transparency, labour rights, and environmental stewardship. These trends underscore the urgency for cotton stakeholders to innovate, adapt, and reposition themselves in a more demanding and dynamic global marketplace.

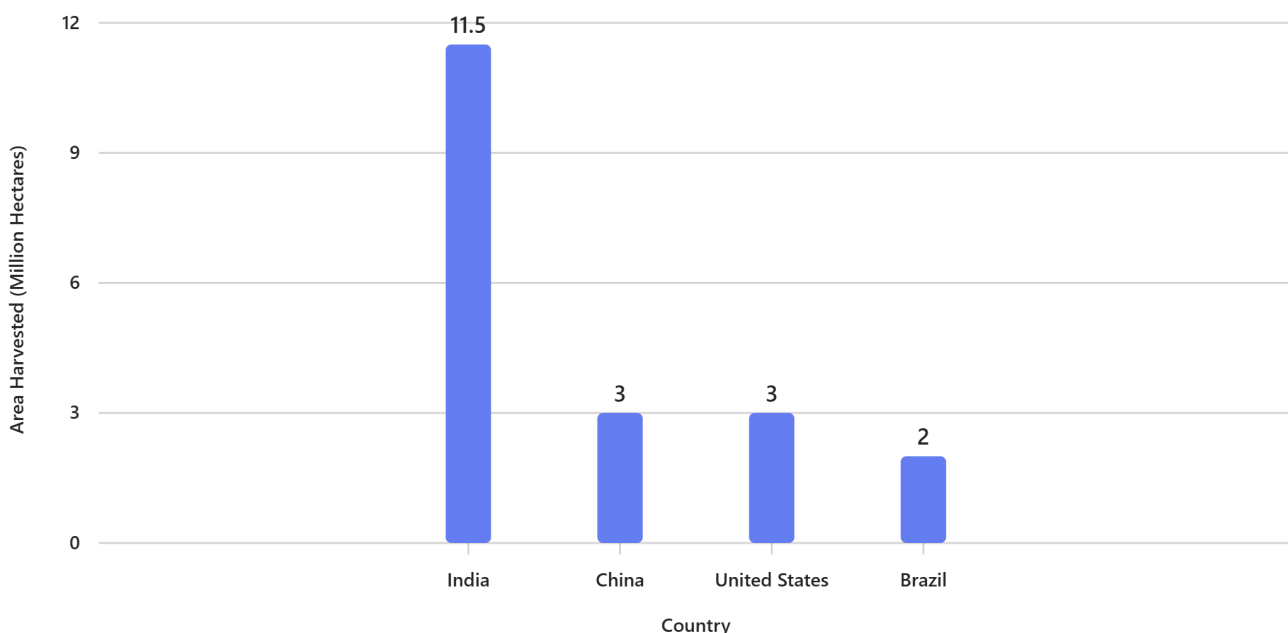
7. Global Cotton Production and Productivity Trends

According to the **USDA's September 2025 World Agricultural Supply and Demand Estimates (WASDE) report**, global cotton production for the 2025/26 season is projected to reach approximately **122 million bales**, reflecting an increase of over 1 million bales from the previous year. This rise is driven by higher outputs in **China, India, and Australia**, which more than offset declines in **Turkey, Mexico**, and several **West African nations**. India, despite having the largest area under cotton cultivation, continues to face challenges with low yields, though slight improvements have been noted. China remains the leader in both production and productivity, supported by advanced agricultural practices. The United States is expected to produce **13.2 million bales**, with yields slightly lower than last year at **861 lbs/acre (~967 kg/ha)**. High-yield regions like Australia continue to exceed **1,800 kg/ha**, while Sub-Saharan Africa and parts of South Asia remain below **500 kg/ha**, reflecting persistent structural and technological constraints.

Globally, cotton consumption is projected to rise—led by China and Vietnam—while ending stocks are forecast to decline to **73.1 million bales**, the lowest level in four years.

Over the past two decades, cotton cultivation patterns have shifted significantly across major producing countries, as illustrated in the “Cotton Area Harvested (Million Ha)” graph. **India** leads significantly with **11.5 million hectares**, reflecting its dominant role in global cotton cultivation. **China** and the **United States** follow, each with **3.0 million hectares**, showcasing their substantial but comparatively smaller cotton-growing regions. **Brazil** rounds out the list with **2.0 million hectares**, highlighting its growing presence in the cotton sector. This distribution underscores the geographic diversity of cotton production and the strategic importance of these countries in the global textile supply chain.

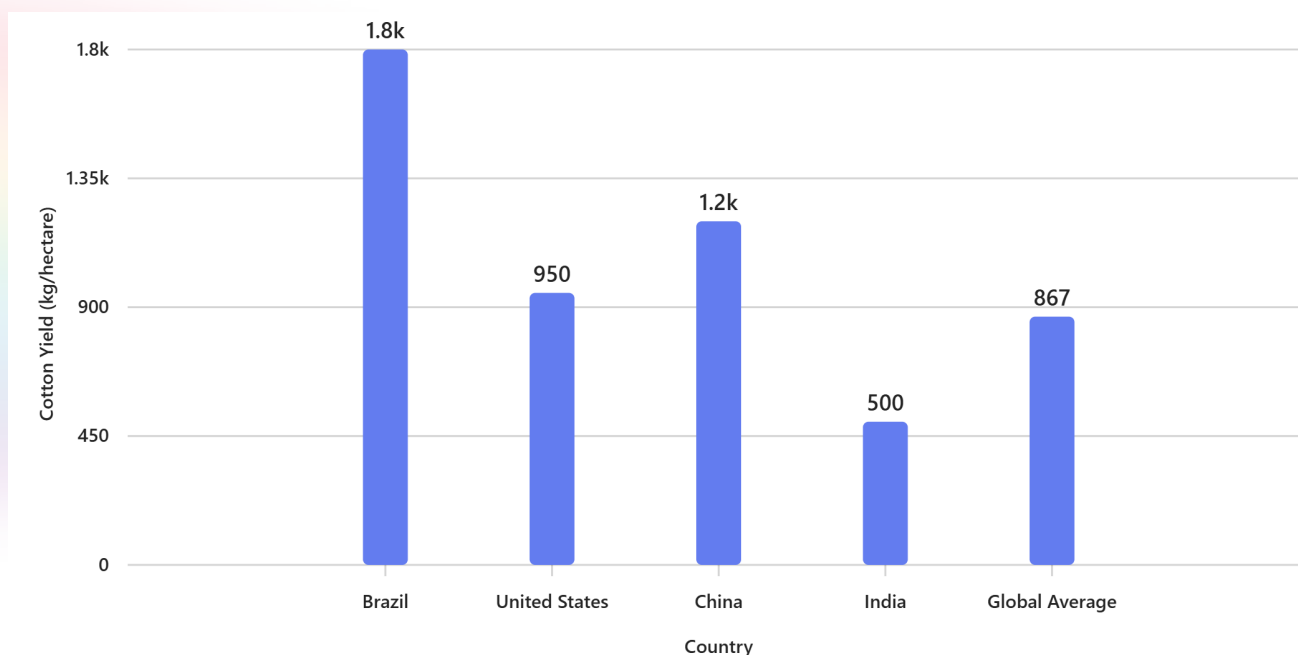
Figure1: Cotton Area Harvested (Million Ha) for the 2024-25 marketing year



Source: USDA September 2025 Cotton and Wool Outlook

When comparing the productivity of cotton farming across five regions: **Brazil** leads global cotton production in terms of yield, achieving an impressive **1,800 kg/hectare**, a testament to its advanced agricultural practices and efficient farming systems. **China** follows with **1,200 kg/hectare**, benefiting from strong infrastructure and technological support. The **United States** maintains a consistent performance with **950 kg/hectare**, slightly above the **global average of 867 kg/hectare**. In contrast, **India**, despite having the largest harvested area, records the **lowest yield at 500 kg/hectare**, highlighting ongoing challenges in productivity and resource efficiency. This disparity underscores the need for targeted improvements in agronomic practices, especially in regions with lower yields.

Figure2: Global cotton yield (Kg/Ha) for the 2024-25 marketing year



Source: USDA September 2025 Cotton and Wool Outlook

8. India's Cotton Production and Productivity Trends

As the second-largest producer of cotton globally, **India's share in global cotton production is estimated to be 20%** for both the 2024–25 and 2025–26 marketing years. (Source: According to the USDA Foreign Agricultural Service). Over the decades, the country has witnessed significant growth in cotton cultivation, production, and yield, driven by technological advancements, policy support, and evolving market dynamics. However, challenges such as climate variability, pest resistance, and uneven regional productivity continue to shape the trajectory of cotton farming. Understanding these trends is essential to unlocking the full potential of India's cotton sector and ensuring its sustainable growth toward 2030.

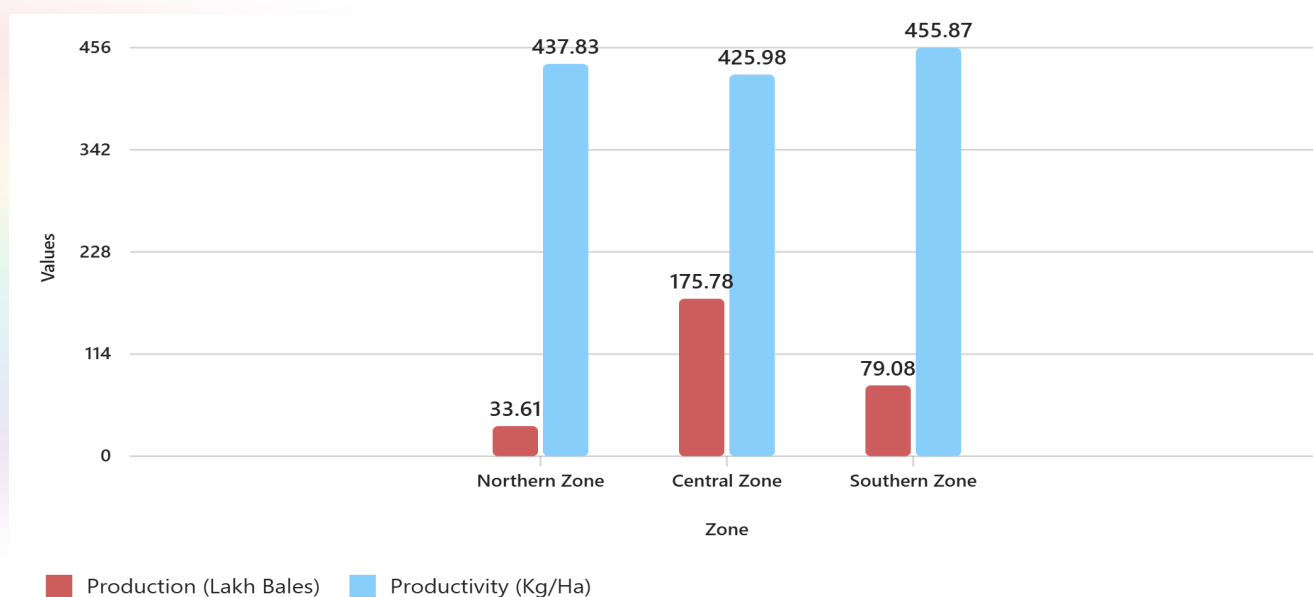
Table 1: India's State wise cotton production

Name of the state	2024-25				
	Area (Lakh hectares)	Production (lakh bales of 170 kgs each)			Yield (Kilogram / Hectare)
		Pressed bales	Loose Cotton	Total	
Punjab	1.00	2.52	0.20	2.72	462.40
Haryana	5.78	11.96	0.48	12.44	365.88
Rajasthan	6.27	17.79	0.66	18.45	500.24
Northern Zone	13.05	32.27	1.34	33.61	437.83
Gujarat	23.92	69.35	1.99	71.34	507.02
Maharashtra	40.86	87.63	1.46	89.09	370.66
Madhya Pradesh	5.37	14.85	0.50	15.35	485.94
CENTRAL ZONE	70.15	171.83	3.95	175.78	425.98
Telangana	18.11	48.95	0.91	49.86	468.04
Andhra Pradesh	4.05	8.47	0.30	8.77	368.12
Karnataka	6.70	18.60	0.55	19.15	485.90
Tamil Nadu	0.63	1.16	0.14	1.30	350.79
SOUTHERN ZONE	29.49	77.18	1.90	79.08	455.87
Orissa	1.47	5.09	0.08	5.17	597.89
Others	0.31	0.61	0.00	0.61	334.52
TOTAL	114.47	286.98	7.27	294.25	436.99

Source: Based on provisional estimates from the Committee on Cotton Production and Consumption (COCPC) for FY 2024-25

In the fiscal year 2024-25, the **Central Zone** emerged as the leader in cotton production, contributing a substantial **175.78 lakh bales** to the national output. Meanwhile, the **Southern Zone** recorded the **highest productivity**, with an impressive yield of **455.87 kg per hectare**, followed closely by the **Northern Zone** at **437.83 kg/ha**. This contrast highlights the Central Zone's extensive cultivation area and volume-driven dominance, while the Southern Zone showcases efficiency and yield optimization in cotton farming.

Figure 3: Zone wise Production & Productivity (2024-25)



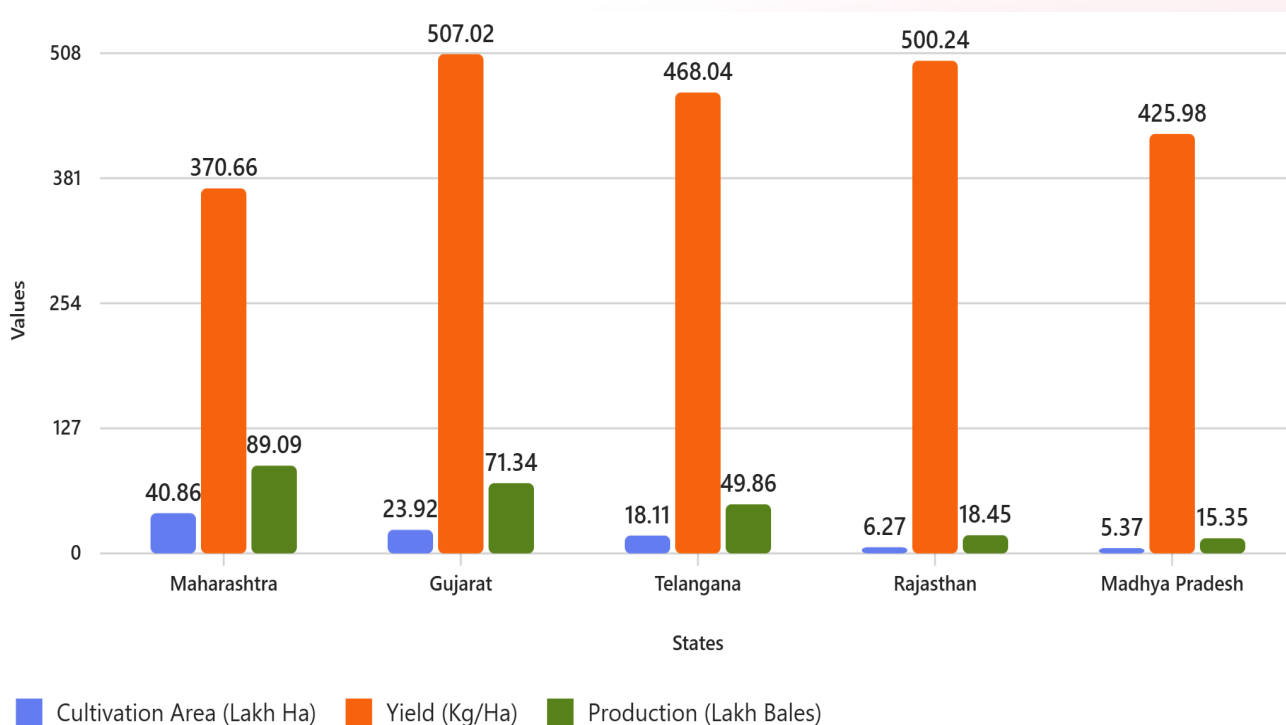
Source: Based on provisional estimates from the Committee on Cotton Production and Consumption (COCPC) for FY 2024-25

Production is concentrated in a few states and regions in India:

1. Maharashtra leading the country with **89.09 lakh bales**, Maharashtra has overtaken Gujarat as the top producer. With **40.86 lakh hectares** under cultivation and a yield of **370.66 kg/ha**, it remains a cornerstone of India's cotton economy.
2. Gujarat, often hailed as the "Textile Capital of India," & India's "Cotton Bowl" leads in denim production and houses numerous spinning mills, with cities like Ahmedabad and Surat serving as major centers for high-quality fabric manufacturing. Producing **71.34 lakh bales**, Gujarat continues to be a high-productivity hub with a yield of **507.02 kg/ha** across **23.92 lakh hectares**, despite a decline from the previous year.
3. **Telangana** contributing **49.86 lakh bales**, Telangana maintains steady output with a yield of **468.04 kg/ha** over **18.11 lakh hectares**, supporting the Southern cotton belt.
4. **Rajasthan** with **18.45 lakh bales**, showcases strong efficiency with a yield of **500.24 kg/ha** across **6.27 lakh hectares**, reflecting modern farming practices.
5. **Madhya Pradesh** producing **15.35 lakh bales**, Madhya Pradesh plays a vital role in the Central Zone, with a yield of **425.98 kg/ha** over **5.37 lakh hectares**.

These states collectively form the backbone of India's cotton production, which is estimated at **294.25 lakh bales** for the 2024-25 season.

Figure 4: Top cotton-producing states in India for FY 2024–25



Source: Based on provisional estimates from the Committee on Cotton Production and Consumption (COCPC) for FY 2024–25

Together, these regions significantly contribute to India's cotton textile industry, blending tradition with modern innovation. India's cotton economy is thus defined by scale and regional dominance but constrained by chronic yield gaps. Long-term competitiveness will hinge on pest- and climate-resilient varieties, irrigation efficiency, extension delivery, and mechanisation to narrow the productivity divide with leading global producers.

9. Global & Indian Institutions and Policy Framework in the Cotton Sector

The governance of the global cotton sector rests on a multi-tiered framework involving international organizations, national ministries, and specialized research institutions.

- **International Cotton Advisory Committee (ICAC):** Acts as a global knowledge hub, offering technical analysis, production statistics, and best practices to enhance cotton trade and sustainability worldwide.
- **Food and Agriculture Organization (FAO):** Integrates cotton into global sustainability frameworks and long-term agricultural planning. According to the *OECD–FAO Agricultural Outlook 2025–34*, global cotton output is projected to grow by 1.3% annually, reaching 29.5 million tonnes by 2034—driven primarily by yield improvements.

- **World Trade Organization (WTO):** Influences global cotton trade through negotiations on subsidies and tariffs. Ongoing disputes between heavily subsidized producers (e.g., US, EU) and West African exporters underscore the sector's geopolitical complexity.
- **Ministry of Textiles (MoT), India:** Leads national textile policy, promotes exports, and spearheads initiatives like the National Technical Textiles Mission to modernize and diversify cotton applications.
- **Ministry of Agriculture & Farmers' Welfare (MoAFW), India:** Manages cotton area allocation, productivity enhancement programs, and the Minimum Support Price (MSP) mechanism to safeguard farmer interests.
- **Cotton Corporation of India (CCI):** CCI was established on 31st July 1970 under the administrative control of Ministry of Textiles, Government of India as a Public Sector Undertaking under the Companies Act 1956. CCI is having pan India presence through headquarters at Navi Mumbai (Maharashtra) to safeguard the economic interest of cotton farmers in all the cotton growing regions and to ensure smooth supply of good quality cotton to the textile industry in India. The major role of the CCI is to undertake price support operations, whenever the market prices of cotton falls below the minimum support prices (MSP). It plays a stabilizing role by procuring cotton at MSP during market gluts, ensuring income security for farmers and maintaining supply chain balance.
- **Ministry of Commerce & Industry / Directorate General of Foreign Trade (DGFT), India:** Regulates cotton and yarn trade flows through export–import policies, including restrictions and incentives to align with market dynamics.
- **ICAR–Central Institute for Cotton Research (CICR) & State Agricultural Universities (SAUs):** Drive innovation in varietal development, pest management, and farmer education. Notably, CICR released 7 new non-Bt varieties and 57 Bt hybrids in 2024–25, enhancing crop resilience and productivity.
- **Bureau of Indian Standards (BIS):** Maintains fibre quality benchmarks, supporting both domestic manufacturing and international trade competitiveness.

10. Global Challenges in Cotton Sector:

The global cotton sector is navigating a complex landscape of challenges that threaten its long-term sustainability and competitiveness. **Climate vulnerability** marked by rising temperatures, erratic rainfall, and increasing water scarcity is undermining yields in key cotton-producing regions. Simultaneously, **synthetic fibres** like polyester are gaining market share due to their cost-effectiveness and scalability, further eroding cotton's dominance. **Market volatility**, driven by fluctuating global prices, trade tensions, and contentious subsidy regimes, adds to the uncertainty faced by producers. **Environmental concerns** around cotton's high water and pes-

ticide usage, along with labour-related issues, have attracted growing scrutiny and regulatory pressure. **Policy instability**, including export bans, WTO disputes, and inefficient procurement systems, distorts market signals and hampers long-term planning. Adding to these challenges are **US tariff-related trade disputes** which disrupt traditional export flows, create uncertainty for farmers, and force shifts in sourcing strategies. Together, these interconnected issues demand urgent innovation, policy coherence, and coordinated global action to secure the future of cotton.

10.1 Ripple Effects of US Tariffs on Global Cotton and Textile Trade

The imposition of US tariffs on Indian textiles has triggered a complex ripple effect across the global cotton ecosystem disrupting trade flows, reducing export demand, and forcing strategic shifts among producers and cotton ecosystem, impacting major producers like India and the US, textile exporters, and supply chains.

Impact on the Indian cotton ecosystem

As the US is a key importer of Indian textiles, reciprocal tariffs reportedly as high as 50% have rendered Indian garments less competitive, leading to a sharp decline in export orders and forcing some manufacturers to halt production. In response, the Indian government has temporarily removed the 11% import duty on cotton to support the industry and enhance export competitiveness. This policy shift has led to a surge in cotton imports, particularly from countries like Vietnam, where prices are lower and cotton quality meets industrial standards. However, the influx of cheaper foreign cotton poses a challenge for domestic farmers, as it can depress local cotton prices despite the duty exemption being temporary. To mitigate these risks and reduce dependency on the US market, experts suggest India should diversify its export destinations and strengthen trade ties with other countries.

Impact on the global cotton supply chain

The global cotton supply chain has experienced notable disruptions due to tariff-related trade tensions, leading to increased costs and market instability. Tariffs imposed on key textile-exporting countries have driven up production and sourcing expenses, ultimately resulting in higher prices for consumers. Meanwhile, countries not subject to these tariffs such as Bangladesh, Cambodia, and Vietnam have benefited from trade diversion, receiving redirected orders as buyers seek alternatives to Indian goods. These shifts have exposed vulnerabilities in the global supply chain, revealing how dependent the system is on stable trade relations and how difficult it can be for alternative suppliers to absorb displaced demand. Additionally, the geopolitical nature of tariff disputes has introduced heightened market volatility, with cotton futures fluctuating in response to policy changes and trade negotiations. This evolving landscape underscores the need for resilient supply chain strategies and diversified sourcing to mitigate future risks.

Strategic Levers

To strengthen its global position and future-proof the cotton industry, strategic levers must be activated across infrastructure, standards, and trade policy.

- **Upgrading ginning and spinning infrastructure**– is critical to improving Fiber quality, reducing post-harvest losses, and enhancing value addition within domestic markets. Modernized facilities equipped with energy-efficient machinery and digital monitoring systems can significantly boost productivity and competitiveness.
- **Aligning with global standards (Better Cotton, Organic, ESG)**– Equally important is alignment with global standards such as Better Cotton Initiative (BCI), Organic certifications, and Environmental, Social, and Governance (ESG) frameworks. These standards not only ensure compliance with international buyer requirements but also elevate the industry's reputation for sustainability and ethical sourcing.
- **Leveraging FTAs for market access and tariff advantages**– Furthermore, leveraging Free Trade Agreements (FTAs) offers a strategic pathway to expand market access, reduce tariff burdens, and diversify export destinations. By negotiating favourable terms and aligning domestic policies with global trade norms, cotton-exporting nations can unlock new opportunities and mitigate risks from protectionist barriers. Together, these levers form a cohesive strategy to enhance quality, sustainability, and global reach essential pillars for a resilient cotton ecosystem by 2040.

Actionable Insights

To unlock new growth opportunities and build resilience in the cotton industry, stakeholders must act decisively across multiple fronts.

- **Farmers** can significantly enhance their market access and income by participating in certification programs such as Better Cotton Initiative (BCI), Organic, or Fairtrade. These certifications not only validate sustainable and ethical farming practices but also open doors to premium international markets where buyers increasingly demand traceable and responsibly sourced cotton.
- **Industry players** must prioritize the modernization of ginning and spinning units by adopting energy-efficient technologies, digital quality control systems, and waste-reducing innovations. This not only improves fiber quality and operational efficiency but also strengthens brand equity in the global sustainable cotton segment
- **Policymakers** have a critical role in negotiating favourable Free Trade Agreements (FTAs) that reduce tariffs and open new export channels. Streamlining export logistics through better port infrastructure, digitized customs processes, and reduced bureaucratic hurdles can further enhance competitiveness and ensure timely delivery to global buyers. Together, these actions form a cohesive strategy to elevate the cotton sector into a future-ready, climate-smart, and globally respected industry.

11. India's Textile & Apparel Industry: Domestic and International Market

India's textile and apparel sector is a cornerstone of its industrial economy, valued at over **USD 179 billion**, and providing direct & indirect employment to more than **105 million people**. It contributes approximately 8% to India's merchandise exports, underscoring its strategic importance.

Domestic Market Growth

The industry is poised for robust expansion, driven by Demographic dividend, rising lifestyle spending & growth of organized retail and e-commerce, especially in Tier 2 and Tier 3 cities and rural areas. With a 12% CAGR from 2023, domestic sales have a visionary target of **USD 250 billion by 2030**, reflecting strong long-term demand (Source: According to a report of Confederation of Indian Industry (CII)).

International Trade & Export Potential

India is currently the **6th largest exporter** of textiles and apparel, accounting for 3.9% of global trade in 2024. Export revenues are targeted to **double to USD 100 billion by 2030**.

India: Global Position & Production Capacity

India has the 2nd largest textile manufacturing capacity globally. It is the 2nd largest producer of cotton with share in global cotton production estimated to be **20%** supported by the USDA Foreign Agricultural Service.

12. Government Initiatives Supporting Textile Growth in India

India's textile sector, one of the oldest and most significant contributors to the country's industrial and economic development, has received strong policy backing from the government in recent years. Recognizing its potential to generate employment, boost exports, and drive inclusive growth, the Government of India has launched a series of strategic initiatives aimed at modernizing the industry, enhancing competitiveness, and positioning India as a global textile manufacturing hub. Through targeted schemes and collaborative efforts across ministries, the government is laying the foundation for a resilient, innovation-driven, and globally competitive textile ecosystem.

12.1 Mission for Cotton Productivity: Textile Vision 2030, India

As part of the Government of India's ambitious Textile Vision 2030, the Union Budget 2025–26 introduced a dedicated Mission for Cotton Productivity aimed at revitalizing India's cotton sector.

This five-year initiative is designed to significantly enhance cotton production and quality, aligning with the broader goal of building a USD 250 billion textile and apparel industry and achieving USD 100 billion in global textile exports by 2030. The mission emphasizes scientific and technological support for cotton farmers, in line with the Government's 5F vision—*Farm to Fibre, Fibre to Factory, Factory to Fashion, Fashion to Foreign*. Spearheaded by the Department of Agricultural Research & Education (DARE), with the Ministry of Textiles as a key partner, the initiative focuses on enhancing cotton productivity through the adoption of advanced scientific methods and the development of climate-smart, pest-resistant, and high-yielding cotton varieties, including Extra Long Staple (ELS) cotton. Known for its superior fibre strength, softness, and durability, ELS cotton is critical to improving the quality of India's textile output. The mission also promotes the use of biotechnology and modern breeding techniques to improve fibre quality, while equipping farmers with cutting-edge tools to build resilience against climatic and pest-related challenges. This strategic intervention is expected to boost farm incomes and ensure a reliable supply of premium cotton for India's growing textile industry.

12.2 PM MITRA Parks

The PM MITRA Parks scheme is a transformative initiative aimed at strengthening India's textile infrastructure with an objective to create 7 mega integrated textile parks with world-class infrastructure to consolidate the entire textile value chain. It is inspired by the visionary 5F formula—*Farm to Fibre to Factory to Fashion to Foreign*—which encapsulates the entire textile value chain. Each park spans approximately 1000 acres and is designed to integrate all major processes including spinning, weaving, dyeing, printing, and garmenting. These parks offer plug-and-play infrastructure, along with worker hostels, logistics hubs, and R&D centers, creating a comprehensive ecosystem that supports both manufacturing efficiency and worker welfare.

The scheme is poised to make a significant impact on employment and investment in India's textile sector. Each park is expected to generate around 1 lakh direct and 2 lakh indirect jobs, contributing substantially to regional economic development. With an estimated investment of ₹10,000 crore per park, the initiative is designed to attract large-scale industrial participation. A leading example is the Dhar Park in Madhya Pradesh, which stands as the first operational site under the scheme. It features a 20 MLD effluent treatment plant, a 10 MVA solar power plant, 81 plug-and-play units, and comprehensive worker housing, including women-friendly infrastructure demonstrating the scheme's commitment to sustainability, inclusivity, and industrial excellence.

12.3 PLI Scheme

The Production Linked Incentive (PLI) Scheme for Textiles is structured with a total outlay of ₹10,683 crore over five years, aimed at boosting the production of Man-Made Fibre (MMF) apparel, fabrics, and technical textiles. It offers two investment tiers: a minimum of ₹300 crore for large firms and ₹100 crore for mid-sized firms, with incentives linked to turnover growth up to

15% in the first year. So far, 64 companies have committed ₹6,000 crore, and 24 MSMEs have been approved under the scheme. The projected turnover from these investments is expected to reach ₹2.16 lakh crore, including significant export contributions. However, a notable challenge is the exclusion of cotton garments, which limits the scheme's benefits for traditional exporters who dominate India's cotton-based textile segment.

12.4 Samarth Skilling Program

The SAMARTH Skilling Program is a flagship initiative aimed at enhancing workforce capabilities in India's textile sector. It offers National Skills Qualifications Framework (NSQF) aligned courses across 10 sub-sectors, including garments, silk, jute, wool, and others, with a strong emphasis on inclusivity particularly for women and marginalized groups. A key feature of the program is its 70% placement mandate for entry-level training, ensuring that skill development translates into meaningful employment. As of July 2025, the program has successfully trained 4.65 lakh individuals, with 70% placed in organized industry roles. Notably, 88.3% of the trainees are women, reflecting its gender-responsive approach. The program is supported by 164 implementing partners and operates through a robust network of over 4000 training centers across the country. (Source: Official Samarth Dashboard managed by the Ministry of Textiles, Government of India)

12.5 IPDS (Integrated Processing Development Scheme)

With an outlay of ₹500 crore, the initiative supports both Greenfield and Brownfield projects aimed at Modernizing textile processing with eco-friendly infrastructure and enhancing environmental sustainability. It emphasizes Zero Liquid Discharge (ZLD), Common Effluent Treatment Plants (CETPs), and renewable energy solutions. So far, six projects have been sanctioned, including a ZLD system in Balotra, Rajasthan featuring solar evaporation and reverse osmosis, and an advanced chemical-biological treatment facility in Sanganer, Rajasthan. These efforts promote sustainable industrial practices and strengthen pollution control measures across key regions.

12.6 NHDP (National Handloom Development Programme)

To support handloom weavers through financial aid, infrastructure, and market access, the initiative encompasses a comprehensive support system for weavers, including cluster development, marketing assistance, and concessional credit, alongside social welfare measures such as scholarships, pensions for awardees, and insurance coverage under Pradhan Mantri Jeevan Jyoti Bima Yojana (PMJJBY) and Pradhan Mantri Suraksha Bima Yojana (PMSBY). In FY25 alone, ₹192 crore was disbursed, benefiting over 6.27 lakh weavers across the country. Notably, 123 clusters in Northeast India received targeted support, with Sualkuchi in Assam being promoted as a global handloom hub, showcasing the program's commitment to preserving traditional crafts while empowering artisan communities.

12.7 Raw Material Supply Scheme

The Raw Material Supply Scheme (RMSS), formerly known as the Yarn Supply Scheme (YSS), is a centrally sponsored initiative aimed at strengthening the handloom sector by ensuring the availability of quality yarn and its blends to eligible handloom weavers at subsidized rates. The scheme seeks to stabilize yarn prices and maintain consistent quality in the open market, thereby enhancing affordability and competitiveness for decentralized textile producers. It also addresses infrastructural gaps in dyeing facilities by facilitating the supply of dyed yarn, enabling product diversification and improved marketability. Furthermore, RMSS supports handloom weavers in competing with the mill sector, where productivity is comparatively higher.

The scheme comprises two key components:

- **Transport Subsidy:** Reimbursement of freight charges for transportation of all types of yarn.
- **Price Subsidy:** A 15% subsidy on cotton hank yarn, domestic silk, woollen, linen, and blended yarns of natural fibres, disbursed through Direct Benefit Transfer (DBT) to the weaver's linked bank account, subject to quantitative restrictions.

The RMSS plays a critical role in sustaining livelihoods, promoting inclusive growth, and enhancing the resilience of India's traditional textile ecosystem (*Source: Ministry of Textiles, Government of India*)

12.9 The Kasturi Cotton Bharat programme

The Kasturi Cotton Bharat programme, launched by the Ministry of Textiles, marks a significant step toward enhancing the traceability, certification, and global branding of Indian cotton. This initiative is a collaborative effort involving the Government of India (through the Cotton Corporation of India), trade bodies, and industry stakeholders, aimed at establishing India's cotton as a premium, reliable product in global markets. A key feature of the programme is its block-chain-based platform and QR code-enabled microsite, which provide end-to-end traceability and transaction certification, ensuring transparency across the cotton value chain. Promoted at both national and international levels, the programme has received central funding, with no state-specific allocations. As of now, 343 modernised ginning and pressing units are registered under the scheme, including 15 units in Andhra Pradesh, where around 100 bales have already been certified under the Kasturi Cotton Bharat brand, reflecting growing adoption and impact.

13. Strategic Roadmap: 2040

Vision: A climate-resilient, tech-enabled, and globally competitive cotton ecosystem that empowers farmers, drives textile innovation, and meets sustainability goals.

Roadmap Pillars

The strategic roadmap for India's cotton sector is anchored in five transformative pillars that collectively drive textile industry growth, sustainability, and global competitiveness. Digital Transformation will scale precision farming through IoT, satellite imaging, and AI-driven advisory, while blockchain-enabled traceability ensures transparency and compliance with global standards like GOTS and the EU Green Deal. Climate Resilience focuses on promoting regenerative agriculture and climate-smart cotton varieties to stabilize yields and reduce environmental impact. Quality & Compliance calls for robust infrastructure investment and widespread adoption of global certifications to elevate fibre standards and meet export benchmarks. Market Access will be enhanced by operationalizing Free Trade Agreements (FTAs) and developing cotton export corridors that streamline logistics and reduce trade barriers. Finally, Farmer Empowerment emphasizes strengthening extension services, cooperative models, and income diversification strategies to build a resilient, inclusive supply base. Together, these pillars form a future-ready cotton ecosystem that fuels innovation, secures sustainability, and propels India's textile industry onto the global stage.

Cross-Sector Collaboration

Cross-sector collaboration is essential for building a resilient and globally competitive cotton ecosystem, with each stakeholder playing a distinct yet interconnected role. Farmers serve as frontline innovators, adopting climate-smart practices that enhance sustainability and productivity at the grassroots level. Industry players act as enablers by integrating advanced technologies, ensuring quality standards, and driving global branding for Indian textiles. Policymakers shape the enabling environment through supportive regulations, trade frameworks, and incentive schemes that promote sustainable agriculture and textile exports. Meanwhile, academia and NGOs function as catalysts, fostering research, capacity building, and community engagement to bridge knowledge gaps and empower stakeholders. Together, this collaborative network forms the backbone of a future-ready cotton-to-textile value chain.

14. Stakeholder Insights and Strategic Recommendations

India's cotton sector stands at a critical juncture where sustainability, innovation, and trade competitiveness must converge to secure long-term growth. To achieve this, coordinated action across stakeholders is essential, backed by robust policy, investment, and technology transfer.

14.1 Advance Sustainability & Climate Resilience Measures

- **Adopt Regenerative Practices:** Promote organic, fair-trade, and circular farming models to capture premium global markets, where sustainable cotton commands 20–30% higher prices.
- **Standardize Eco-Certification:** Implement uniform protocols for traceability, Global Organic Textile Standard (GOTS) certification, and organic standards to meet rising consumer and regulatory demands, especially in the EU and US.
- **Scale Climate-Smart Agriculture:** Expand drip irrigation (supported under Pradhan Mantri Krishi Sinchayee Yojana-PMKSY), heat-tolerant germplasm, and low-input farming to reduce emissions and ensure yield stability amid climate volatility.
- **Empower Farmers via Transparent Markets:** Streamline procurement and stabilization mechanisms to improve price realization and reduce dependency on middlemen.

14.2. Accelerate Technology Transfer & Innovation

- **Boost Collaborative R&D:** Investment in fibre quality, pest resistance, and smart farming tools & prioritize cotton-based innovations.
- **Bridge Adoption Gaps:** Strengthen extension networks to help farmers access improved seeds, AI-driven pest management, and precision tools like soil sensors and mobile advisory apps.
- **Enable Smart Fabrics:** Support industry-led innovation in smart textiles and organic blends, with India's technical textiles market projected to reach \$40–50 billion by 2025.

14.3. Reform Trade & Market Accessibility

- **Resolve Tariff Distortions:** Enhance transparency in subsidy regimes and remove barriers that limit developing-country producers from accessing global markets.
- **Improve Fibre Grading & Certification:** Establish national grading standards to boost export competitiveness and meet international quality benchmarks.
- **Promote Ethical Branding:** Encourage industry to build traceable supply chains and brand India's cotton as ethical, sustainable, and premium grade.

14.4. Strengthen Institutional & Value Chain Development

- **Incentivize Domestic Manufacturing:** To strengthen domestic manufacturing and reduce dependence on raw cotton exports, India is strategically shifting toward value-added segments such as ginning, spinning, and apparel production. This transition is being facilitated through targeted subsidies, infrastructure development under schemes like PM MITRA, and modernization support via TUFS. Export incentives are being restructured to favor finished goods, while transport and input cost subsidies enhance competitiveness. Concessional credit access and skill development initiatives further empower MSMEs and workers across the textile value chain. Collectively, these measures aim to build a resilient, high-value textile ecosystem that maximizes domestic value addition and global market presence.
- **Foster Cross-Sector Collaboration:** Fostering cross-sector collaboration in India's textile industry involves engaging farmers as climate stewards, industry as technology enablers, policymakers as ecosystem architects, and academia/NGOs as research and training hubs. This can be achieved through integrated initiatives that promote sustainable farming, regenerative agriculture, and eco-friendly production practices. For instance, the Confederation of Indian Textile Industry (CITI) & International Labour Organization (ILO) partnership in Madhya Pradesh focuses on improving labour rights and livelihoods for 6.5 million cotton farmers, especially women and smallholders, by integrating them into global supply chains. Similarly, the InTex India project, supported by the Ministry of Textiles and UNEP, empowers SMEs in hubs like Surat and Karur (Gujarat) to adopt circular business models through training and policy support. Platforms like Bharat Tex 2024 further enable collaboration by bringing together industry leaders, government bodies, and academia to advance ESG goals and sustainable innovation. These examples demonstrate how coordinated efforts across sectors can drive inclusive growth, environmental stewardship, and global competitiveness in textiles.
- **Build Export-Ready Ecosystems:** To build export-ready ecosystems and align cotton production with India's \$100 billion textile export target by 2030 (*reported by The Economic Times*), a multi-pronged strategy is essential. This includes strengthening farm-to-factory linkages, promoting high-quality cotton cultivation through certified seeds and sustainable practices, and ensuring consistent quality through traceability systems and global certifications like Global Organic Textile Standard (GOTS) and International Association for Research and Testing in the Field of Textile and Leather Ecology (OEKO-TEX). Infrastructure investments under schemes like PM MITRA can support integrated textile parks with testing labs, logistics hubs, and compliance support. Additionally, export incentives, capacity-building programs, and digital platforms for global market access can empower manufacturers and MSMEs. Collaborative efforts between farmers, industry, and policymakers are key to ensuring that Indian textiles meet international standards in quality, sustainability, and ethical sourcing.

15. Conclusion

Cotton 2040 is not just a vision; it's a call to action. By embracing technology, confronting climate risks, and competing globally, India and other cotton-producing nations can build a resilient, inclusive, and sustainable cotton future. This transformation demands bold leadership, collaborative innovation, and unwavering commitment across the value chain.

By 2040, the cotton industry can evolve into a climate-resilient, tech-enabled, and socially equitable sector. Achieving this vision requires coordinated action across the value chain, bold investments, and a commitment to sustainability and innovation.

16. About CITI

Confederation of Indian Textile Industry (CITI) is the apex industry chamber that covers the entire spectrum of the Textile and Clothing Industry spanning domestic and exporting unit, including regional and sectoral associations from farms to garments and even textile machinery. CITI has signed MOUs with thirteen major International Textile Associations for the promotion of textiles trade and investment. It, directly and indirectly, serves an industry that connects to millions of farmers, 100 million plus workforce, and 1.3 billion consumers. The cumulative annual turnover of CITI members is around US\$ 30 billion. CITI acts as a key interface between the Government of India and the textile industry, offering policy inputs and supporting associations in capacity building, awareness creation, and policy development to drive sectoral growth. As a founding member of the National Skill Development Corporation and promoter of the Textile Sector Skill Council, it plays a leading role in strengthening the industry's skilled workforce. CITI also contributes to technology advancement as a founding member of the India ITME Society. Through its subsidiary, the Cotton Development and Research Association (CITI-CDRA), it has supported cotton extension and seed development since 1964. Additionally, CITI's Young Entrepreneurs Group (YEG), established in 2003, brings together emerging leaders from across the textile value chain.

17. About ICFA

The Indian Chamber of Food & Agriculture is India's apex national body dedicated to policy research, advocacy, trade facilitation, technology advancement, and investment promotion in the food and agriculture sector. Recognized by the Ministry of Commerce and Industries, ICFA plays a crucial role in empowering farmers, addressing agricultural development challenges, ensuring food security, and promoting environmental sustainability. With a proactive agribusiness policy and global partnerships, ICFA creates growth opportunities, enhances value addition, and helps improve farmer incomes. Through its Working Groups and Business Councils, the Chamber

represents stakeholders at the national level while positioning India's agri-food sector globally. Beyond trade and industry, ICFA focuses on farmers and farm entrepreneurs, facilitating market access and addressing policy, technology, trade, marketing, financing, and partnership challenges.

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