



## COTTON INDUSTRY

**SYLLABUS:**

GS 1 > Indian Geography >> Indian Industries

**REFERENCE NEWS:**

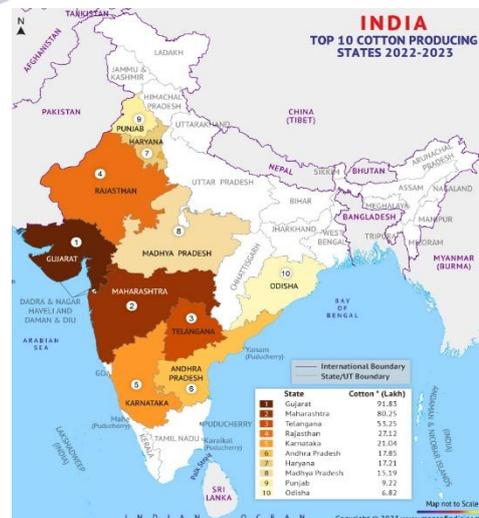
A significant meeting aimed at boosting cotton productivity was convened at the ICAR–Sugarcane Breeding Institute in Coimbatore, Tamil Nadu, under the leadership of Union Minister for Agriculture, Farmers’ Welfare, and Rural Development, Shri Shivraj Singh Chouhan. The meeting saw in-depth discussions on the history of cotton, the current scenario, challenges, and future strategies for increasing cotton productivity in India.

**COTTON CULTIVATION IN INDIA:**

Cotton, often called ‘**White Gold**’, is one of India’s most significant **commercial crops** and the **backbone of the Indian textile industry**. India is not only the **largest cotton cultivator** by area globally but also a **leading producer and consumer**. The cotton industry supports **millions of livelihoods**, contributes to **exports**, and is critical to India’s **self-reliance and rural economy**.

**Major Cotton Growing Regions**

- **Northern Zone:** Punjab, Haryana, Rajasthan
- **Central Zone:** Gujarat, Maharashtra, Madhya Pradesh
- **Southern Zone:** Telangana, Andhra Pradesh, Karnataka
- Gujarat is often the **leading cotton-producing state**.



### Agro-Climatic Requirements

- **Temperature:** Optimal: 21–27°C; can tolerate up to 43°C
- **Rainfall:** 50–100 cm; prefers dry weather during boll formation
- **Soils:** Deep black cotton soil (Central India), Well-drained alluvial soil (North India), Semi-tolerant to salinity; sensitive to waterlogging

**Types of Cotton & Genetic Varieties:** India is the **only country growing all four major cotton species:**

- *G. arboreum* and *G. herbaceum* (Desi cotton)
- *G. hirsutum* (American Upland – 90% of hybrid cotton production)
- *G. barbadense* (ELS/Egyptian cotton – used in luxury fabrics)
- **Bt Cotton (Genetically Modified Cotton): Introduced in 2002**, approved by GEAC Contains **Bacillus thuringiensis (Bt)** gene to fight bollworm. Bollgard I and II technologies in use. **CSIR-NBRI** recently developed a GM variety resistant to **pink bollworm**, leafworm, and fall armyworm.

### Government Initiatives

- **Mission for Cotton Productivity (2025–30):** Five-year plan under **Ministry of Textiles**. Aims to promote **Extra-Long Staple (ELS)** cotton, improve **productivity and sustainability**, support through **science and technology**, reduce **import dependence**
- **MSP Procurement by CCI: Cotton Corporation of India (CCI)** procures cotton at **Minimum Support Price (MSP)** without quantity limits **Two types of MSPs** for **medium and long staple** cotton
- **Branding: KASTURI Cotton India.** Promotes Indian cotton as **pure, traceable, and high-quality**. Supports the **Atmanirbhar Bharat initiative**
- **Digital Support: Cott-Ally App**, informs farmers in **regional languages** about MSP, nearest procurement centres and scientific farm practices
- **Technological Interventions: High Density Planting Systems (HDPS).** Improved **Ginning and Pressing technologies**, training and **extension services**.

### SIGNIFICANCE OF COTTON INDUSTRY IN INDIA:

#### Economic Significance

- **Commercial Crop:** Cotton is one of India's major **cash crops**, often referred to as **'White Gold'**.
- **Contribution to GDP:** The **cotton textile industry** is a crucial part of India's manufacturing GDP and export economy.
- **Forex Earnings:** In 2022–23, India exported around **30 lakh bales** of cotton, accounting for **6% of global cotton exports**.

- Cotton is a vital raw material for India's textile and apparel sector, which accounts for **about 12% of total exports** and contributes nearly **2.3% to the GDP**.

### Employment Generation

- **Massive Livelihood Support:** Sustains the livelihood of **6 million cotton farmers** and around **40–50 million people** engaged in allied sectors such as ginning, spinning, processing, and trade.
- **Textile Industry Employment:** The cotton-based textile sector is **India's second-largest employer after agriculture**.
- The Central government's data highlights that the **textile sector contributes about 10% to industrial production** and provides **direct employment to 45 million people**.

### Agricultural Importance

- **Largest Cultivator Globally:** India accounts for **~40% of the global cotton acreage**.
- **Wide Agro-Climatic Coverage:** Grown in three major zones – **North (Punjab, Haryana), Central (Gujarat, Maharashtra), and South (Telangana, Andhra Pradesh)**.
- **Multiple Species:** India is the only country that cultivates all **four major species of cotton** (*G. arboreum*, *G. herbaceum*, *G. hirsutum*, *G. barbadense*).
- India produced **343.47 lakh bales** in 2022–23, making it the **second-largest cotton producer** after China.

### Industrial and MSME Relevance

- **Foundation of Indian Textiles:** Cotton is the **primary raw material** for over **80% of MSMEs** in the textile sector.
- **Linkage to Ginning & Spinning Mills:** Enhances rural industrialisation by supporting thousands of small-scale and cooperative mills.
- The Mission for Cotton Productivity (2025–30) is aligned with the **5F vision (Farm to Fibre to Factory to Fashion to Foreign)** to strengthen MSMEs and boost exports.

### Export Potential and Global Competitiveness

- **Low Import Dependence:** Only **10% of India's cotton consumption is imported** despite its huge textile base.
- **Quality Branding Efforts:** Initiatives like **KASTURI Cotton India** aim to enhance the **global brand image** of Indian cotton.

- India ranks **2nd in global cotton consumption (22.24%)** and exports cotton primarily to **Bangladesh, Vietnam, China, and Indonesia**.

### Technological Significance

- **Adoption of GM Technology:** Bt Cotton (approved in 2002) occupies **over 90% of the cotton cultivation area**, making India a **pioneer in GM crop adoption**.
- **Innovation in Pest Resistance:** CSIR-NBRI recently developed the **world's first Pink Bollworm-resistant GM cotton** with superior resistance compared to Bollgard II.
- Bt cotton has helped India **triple its production** since 2002, though productivity has stagnated recently.

### Climate and Soil Sustainability

- **Adaptability:** Cotton is a **semi-xerophytic crop**, suited to dryland farming, important in arid and semi-arid regions.
- **Soil Utilisation:** Thrives in **black cotton soils**, enabling productive land use in **Maharashtra, Gujarat, and Telangana**.
- **67% of India's cotton is grown in rainfed areas**, making cotton a crucial crop in water-scarce zones.

### Governmental and Policy Importance

- **MSP Support:** Cotton is among the few non-food crops covered under **Minimum Support Price**, procured by **Cotton Corporation of India (CCI)**.
- **National Missions:** Launch of **Mission for Cotton Productivity (2025–30)** to address stagnation in yield and promote **extra-long staple (ELS) cotton**.
- The **Cott-ALLY App** helps farmers access MSP info, ginning centre locations, and best farm practices in local languages.

### CHALLENGES TO COTTON INDUSTRY IN INDIA:

- **Low and Stagnant Productivity:** Despite having the largest area under cotton cultivation globally, India ranks **39th in cotton productivity**. Cotton yield was **435 kg/ha in 2023–24** and **447 kg/ha in 2024–25** — indicating stagnation.
  - India's productivity is significantly lower than **USA (~1000+ kg/ha)**, **Brazil**, and **China**, due to better irrigation and R&D support in those countries.
- **Dependence on Rainfed Agriculture:** Around **67% of India's cotton** is grown in **rainfed regions**, mainly in **Maharashtra, Telangana, and**

**Madhya Pradesh.** Leads to **yield instability** due to erratic monsoons and frequent droughts or unseasonal rains.

- **Maharashtra's Vidarbha region**, a major cotton belt, is frequently affected by crop failures due to rainfall variability.
- **Pest Infestation and Resistance to Bt Cotton:** Cotton is highly susceptible to pests such as **Pink Bollworm**, **Whitefly**, and **American bollworm**. Overuse of Bt Cotton has led to **resistance development** in pests, making **Bollgard II** less effective.
  - **Pink Bollworm outbreaks** have severely affected productivity in **Gujarat and Maharashtra** in recent years.
- **Price Volatility and Market Uncertainty:** Wide fluctuations in cotton prices due to global demand-supply changes, weak procurement infrastructure, and policy unpredictability. Farmers often resort to distress selling due to **lack of awareness of MSP**, or **limited access to CCI procurement centres**.
  - Cotton prices dropped drastically post-2022 due to global slowdown and reduced demand from textile hubs like **China and Bangladesh**.
- **Inefficient Procurement and Inadequate MSP Awareness:** While **Cotton Corporation of India (CCI)** offers MSP procurement, many farmers lack awareness or access. Delayed procurement, lack of grading infrastructure, and limited outreach hinder MSP benefits.
- **Post-Harvest Losses and Poor Infrastructure:** Lack of **modern ginning and pressing factories**, poor **storage facilities**, and delays in **quality assessment** reduce farmer income and fibre quality. Low quality cotton affects **exports** and **global competitiveness**.
  - **High trash content** in Indian cotton bales is a recurring complaint from global buyers like **Vietnam and Turkey**.
- **Low Share of Value Addition:** Majority of cotton is exported or consumed at the **yarn and fabric stage**; little value addition into **finished apparel**. Missed opportunity for **higher earnings, employment generation, and Brand India promotion**.
  - Only a fraction of India's cotton enters **garment export**, limiting scope in high-end fashion markets.
- **Poor Adoption of High-Density Planting and ELS Cotton:** Low adoption of **High-Density Planting Systems (HDPS)** and slow progress in growing **Extra Long Staple (ELS)** cotton varieties. India imports ELS cotton despite favourable conditions to grow it domestically.
  - India **imported ~10% of its ELS cotton needs** in 2023–24 for luxury apparel production.
- **Environmental and Climate Challenges:** Cotton is a **water-intensive crop**, vulnerable to both **drought** and **waterlogging**. Warming trends

and erratic rainfall patterns affect **boll development and fibre quality**. Cotton requires ~**210 frost-free days** and **50–100 cm rainfall**; not viable in high variability zones without adaptation.

- **Policy and Export Challenges:** Frequent export bans, quota changes, or minimum export prices cause **uncertainty in global markets**. Hurts India's credibility and competitiveness as a **reliable cotton exporter**.
  - India imposed export restrictions in **2020 and 2022**, leading to backlash from **textile importers like Bangladesh**.

### WAY FORWARD:

#### **Enhance Productivity through Agronomic Reforms**

- Adopt **High-Density Planting Systems (HDPS)** and short-duration, pest-resistant cotton varieties.
- Encourage use of **climate-resilient seeds** through PPPs with research institutes.
- The **Task Force on Enhancing Cotton Productivity (Ministry of Agriculture, 2016)** recommended HDPS, precision irrigation, and diversified seed systems.
- **Punjab and Gujarat** have piloted HDPS with 25–40% yield improvement.

#### **Integrated Pest and Disease Management**

- Promote **Integrated Pest Management (IPM)** and **biological pest control** alternatives to reduce Bt resistance. Encourage **crop rotation** and avoid monocropping.
- **USA's cotton belt** uses pest scouting, crop rotation, and refuge strategies to delay resistance in GM crops.
- **CSIR-NBRI's Pink Bollworm-Resistant GM Cotton** as an alternative to Bollgard II.

#### **Strengthen Irrigation and Water Management**

- Promote **micro-irrigation** (drip/sprinkler) in rainfed cotton areas under **Per Drop More Crop (PMKSY)**. Expand **rainwater harvesting** and watershed management in cotton belts.
- The **Ashok Dalwai Committee** on Doubling Farmers' Income emphasized micro-irrigation and resource-use efficiency.
- **Maharashtra's Jal Yukt Shivar Scheme** has improved water retention in cotton-growing districts like Marathwada.

#### **Improve Post-Harvest Infrastructure and Market Linkages**

- Modernize **ginning and pressing factories** and incentivize **quality-based cotton grading**. Expand access to **Cotton Corporation of India (CCI)** procurement centres.
- **Kasturi Cotton Initiative** ensures branding, traceability, and quality assurance akin to **Egyptian cotton standards**.

### **Boost Domestic ELS Cotton Production**

- Scale up **Extra Long Staple (ELS) cotton** cultivation in **Tamil Nadu, Karnataka, and Madhya Pradesh** to reduce import dependence.
- Invest in **Indian Council of Agricultural Research (ICAR)** for indigenous seed development.
- The **Cotton Advisory Board** highlighted the need to reduce ELS imports and enhance domestic capacity.
- **Egypt's ELS cotton** is globally renowned due to strict quality control, selective breeding, and branding.

### **Promote Farmer Aggregation and Extension Services**

- Scale up **Farmer Producer Organizations (FPOs)** for collective bargaining, better input purchase, and market access.
- Expand **Krishi Vigyan Kendras (KVKs)** outreach for cotton advisories.
- **Maharashtra's Shetkari Sanghatana** enabled cotton farmers to negotiate better prices through collective action.

### **Enable Value Addition and MSME Support**

- Encourage cotton value chain development—**spinning to apparel**—via the **PM Mega Integrated Textile Region and Apparel (PM MITRA)** parks. Provide credit, skilling, and design support to MSMEs in **textile hubs**.
- The **Suresh Prabhu Committee (2016)** on exports emphasized scaling value-added exports in cotton and technical textiles.
- **Tamil Nadu's Tiruppur cluster** is a global model for integrating spinning, dyeing, garmenting, and exports.

### **Strengthen Export Policy and Branding**

- Provide a **stable export policy**, avoid sudden bans, and encourage **contract farming and futures trading**.
- Promote **Brand India** through global certification of **KASTURI cotton**.
- **Australia's Cotton LEADS Program** ensures traceable, sustainable, high-quality cotton for global buyers.

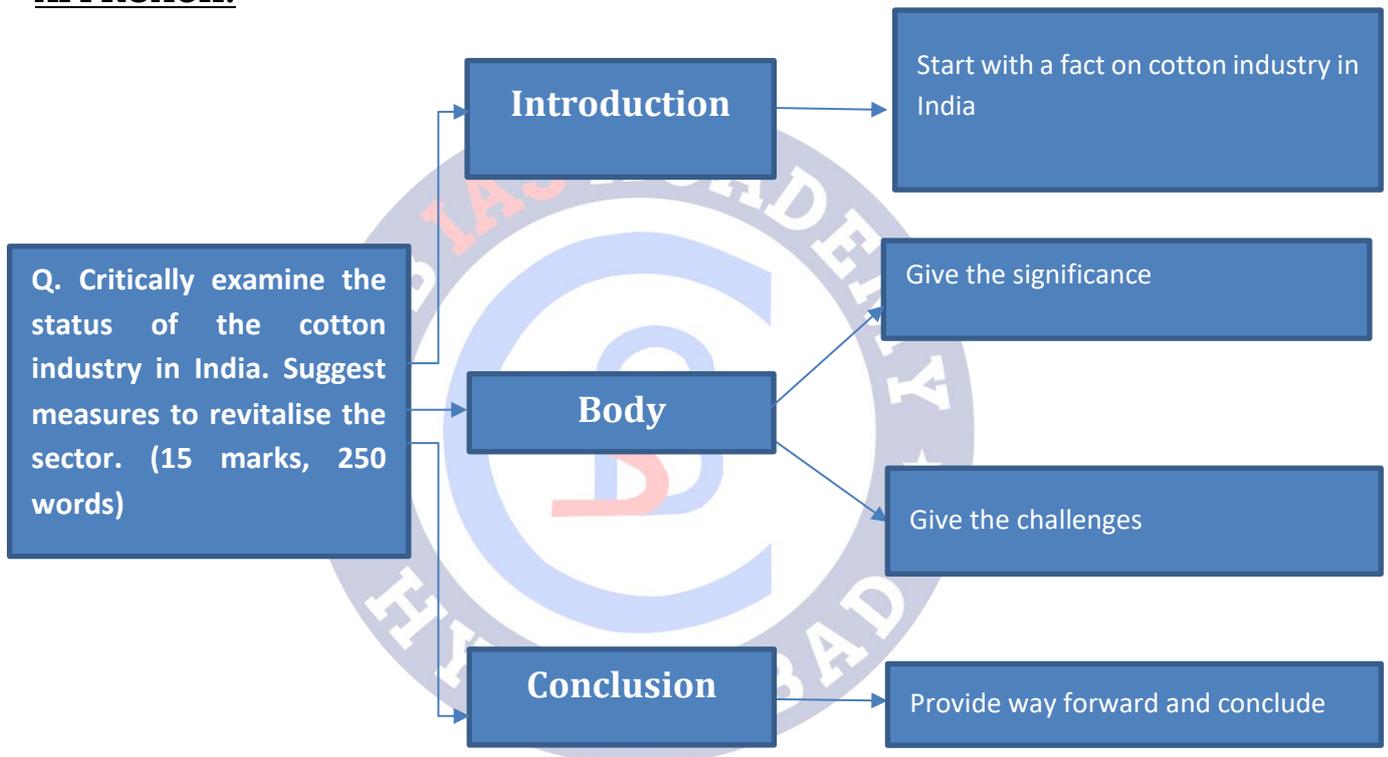
### **Boost R&D and Technology Adoption**

- Strengthen public-private R&D through **ICAR, CSIR, and private seed companies**.
- Promote **AI/remote sensing/drones** for pest monitoring and crop health prediction.
- **National Mission on Sustainable Agriculture** and **Digital Agriculture Mission (2021–25)** can support cotton farming innovation.

**PRACTICE QUESTION:**

**Q. Critically examine the status of the cotton industry in India. Suggest measures to revitalise the sector. (15 marks, 250 words)**

**APPROACH:**



**MODEL ANSWER:**

Cotton, known as **‘White Gold’**, is India’s leading commercial crop and the backbone of its textile sector. India has the **largest area under cotton cultivation globally (~40%)** and ranks **second in production**, making cotton vital for **exports, employment, and rural economy**.

**Status and Significance**

- **Agricultural Footprint:** Cultivated across 3 agro-climatic zones; India is the **only country growing all 4 cotton species**.
- **Livelihood Provider:** Supports **6 million farmers** and **50 million people** in allied industries.

- **Economic Relevance:** Cotton textiles contribute to **2.3% of GDP, 12% of total exports, and 10% of industrial production.**
- **Industrial Linkages:** Cotton is the raw material for **80% of textile MSMEs.**
- **Policy Support:** Initiatives like **MSP through CCI, KASTURI Cotton Branding, and Mission for Cotton Productivity (2025–30)** enhance quality and traceability.

### Challenges

- **Low Productivity:** Yield stagnated around **435–447 kg/ha**, ranking **39th globally.**
- **Rainfed Dependence:** **67%** of cotton is grown in rainfed areas, vulnerable to drought and rainfall variability.
- **Pest Resistance:** Bt Cotton faces **bollworm resistance**, especially Pink Bollworm in Gujarat and Maharashtra.
- **Market Uncertainty:** Price volatility and **lack of MSP awareness** lead to farmer distress.
- **Post-Harvest Losses:** Poor ginning infrastructure, low fibre quality, and limited grading facilities.
- **Low Value Addition:** Cotton is mostly consumed in yarn/fabric form; little enters the **finished apparel export chain.**
- **Climate Sensitivity:** Water-intensive, sensitive to erratic weather; needs **210 frost-free days.**
- **Policy Inconsistencies:** Sudden export bans (2020, 2022) affect global credibility.

### Way Forward

- **Productivity Enhancement:** Adopt **High Density Planting Systems (HDPS)** and **short-duration pest-resistant varieties** (Task Force 2016).
- **Pest Management:** Promote **IPM, crop rotation**, and newer GM seeds like **CSIR-NBRI's Pink Bollworm-resistant cotton.**
- **Irrigation Reforms:** Scale up **micro-irrigation under PMKSY**; replicate **Jal Yukt Shivar** model in dry belts.

- **Value Chain Strengthening:** Invest in **modern ginning, pressing, and branding (KASTURI)**.
- **ELS Promotion:** Incentivise **Extra-Long Staple cotton** in Tamil Nadu, Karnataka to reduce imports.
- **Support MSMEs:** Integrate cotton clusters under **PM MITRA parks** and strengthen **FPOs** for market linkage.
- **Stable Trade Policy:** Avoid export restrictions; encourage **futures markets and contract farming**.

A vibrant cotton industry is crucial for **doubling farmers' income**, boosting **exports**, and promoting **rural industrialisation**. With coordinated reforms, scientific innovation, and inclusive policies, India can reclaim global leadership in **high-quality and sustainable cotton production**, aligned with the **5F vision** — *Farm to Fibre to Factory to Fashion to Foreign*.

