



Cotton Cultivation in North India

For Prelims: [Pink Bollworm \(PBW\)](#), [Cotton](#), [Bt Cotton](#), Pests of Cotton, [kharif](#), [Kasturi cotton](#)

For Mains: Significance of Cotton for India, Reason Associated with Subsequent Decline in Cotton Production in India, India's cotton sector's competitiveness.

[Source: BL](#)

Why in News?

As the **2024-25 kharif cotton planting season** approaches in North India, stakeholders foresee a potential dip in cotton acreages.

- This shift is driven by a confluence of factors, including severe [pink bollworm \(PBW\)](#) infestation, weak prices for the fibre crop, and rising labour costs.
- Farmers, faced with these challenges, may increasingly opt for alternative crops such as paddy, maize, and guar.

What is Pink Bollworm (PBW) Infestation?

- **About:**
 - **PBW (*Pectinophora gossypiella*)** is a major pest within the **American bollworm complex**, primarily affecting cotton crops.
 - PBW, also known as **Saunders**, damages developing cotton fruits such as the **flower bud (square)** and the seed-containing boll.
 - The pest lays eggs on buds, flowers, and bolls, with the hatched larvae burrowing into the bolls to feed on seeds, resulting in lint damage and quality deterioration.
- **Historical Context:**
 - The introduction of [Bt Cotton](#), genetically modified to resist pests like PBW, aimed to mitigate risks. However, **PBW has developed resistance to Bt Cotton over time**, exacerbating the problem.
- **Contributing Factors to Resistance Development:**
 - **Continuous planting of cotton without crop rotation** in central and southern cotton-growing zones favoured PBW persistence.
 - **Illegal cultivation of unapproved Bt/HT seeds** by farmers contributed to PBW resistance development.
 - Extended cultivation of **long-duration hybrids** provided continuous host availability for PBW.
 - Extending the **cotton crop beyond recommended periods** facilitated PBW survival and reproduction.
 - Lack of **adherence to refugia planting exacerbated resistance** development by constant exposure of PBW to Bt protein.
 - Refugia plants are the **biodiversity plants that grow around cultivated plants**, providing a place of **protection and food for natural enemy insects**.

▪ **Impact on Crop Yield and Economy:**

- PBW infestation results in significant yield losses and **affects cotton fibre quality**, impacting farmers' income and sustainability.
- According to entomologists, cotton farms in Haryana have experienced significant damage, with around 25% of farms reporting a 50% loss.
- Punjab has witnessed a 65% damage rate, while Rajasthan tops the list with a staggering 90% loss, underscoring the severe economic repercussions for farmers and the regional economy.

Pests of Cotton

Insect	Symptoms
Spotted bollworm (<i>Earias vitella</i>)	<ul style="list-style-type: none"> ▪ Central shoots dry, wither and drops down. ▪ Later, it bores into flower buds, bolls and causes shredding.
American bollworm (<i>Helicoverpa armigera</i>)	<ul style="list-style-type: none"> ▪ Flaring up of bracts (surround the flower bud in a pyramid-like shape). ▪ Bore holes filled with frass on squares.
Tobacco caterpillar (<i>Spodoptera litura</i>)	<ul style="list-style-type: none"> ▪ Irregular bore holes. ▪ Skeletonization of leaves. ▪ Heavy defoliation.
White fly (<i>Bemisia tabaci</i>)	<ul style="list-style-type: none"> ▪ Suck sap from the leaves ▪ Low quality lint. ▪ Boll shedding occurs in severe cases.
Cotton Aphid (<i>Aphis gossypii</i>)	<ul style="list-style-type: none"> ▪ Both nymphs and adults suck the sap from leaves. ▪ Shiny appearance due to honeydew secretion.
Cotton mealy bug (<i>Phenacoccus solenopsis</i>)	<ul style="list-style-type: none"> ▪ Bushy shoots. ▪ At an early stage of cotton planting, crop senescence (ageing) may be seen. ▪ Sooty mould formation.



What are the Trends in Cotton Cultivation in North India?

▪ **Impact on North Indian States:**

- **Punjab, Rajasthan, and Haryana**, the primary cotton-growing states in North India, are all witnessing fluctuations in cotton acreages.
- Punjab experienced a significant decline of **32% in cotton area during the 2023-24 kharif season**, while Rajasthan witnessed a slight decrease and Haryana saw a marginal increase.

▪ **Shift Towards Alternative Crops:**

- Farmers in North India are exploring alternative crop options such as **paddy, maize, guar, mung beans, and groundnuts** due to quality concerns and poor realisations.
- In Punjab, where water availability is favourable, farmers may revert to paddy cultivation. In Rajasthan, the preference may lean towards guar cultivation, while maize and mung beans could emerge as alternatives in other areas.
- **Labour Costs and Realisations:**
 - **Rising labour costs** further compound the challenges faced by cotton farmers in North India. Additionally, **poor quality resulting from pest infestations** has impacted farmers' realisations, leading to concerns about compensation for crop losses.
- **Expectations for the Coming Season (2024):**
 - Despite the prevailing challenges, some optimism exists regarding the forthcoming cotton season. Favourable monsoon forecasts and relatively better prices offer a glimmer of hope for a modest increase in cotton acreages. However, concerns persist, including the lack of advanced technology and the severity of PBW damages observed in certain areas.

Cotton	
Growing Conditions	<ul style="list-style-type: none"> ▪ Cotton is a Kharif crop that requires 6 to 8 months to mature. ▪ Temperature: Between 21-30°C (Requires a hot, sunny climate with a long frost-free period) ▪ Rainfall: Around 50-100 cm (Most productive in warm and humid conditions). ▪ Soil Requirements: Cotton can be planted in a wide range of soils, from medium to heavy, but black cotton soil is the most ideal for cotton cultivation. ▪ It can tolerate a pH range of 5.5 to 8.5 but is sensitive to waterlogging.
Major Cotton Growing States	<ul style="list-style-type: none"> ▪ Northern Zone: Punjab, Haryana, Rajasthan. ▪ Central Zone: Gujarat, Maharashtra, Madhya Pradesh. ▪ Southern Zone: Telangana, Andhra Pradesh, Karnataka, Tamil Nadu.
Significance	<ul style="list-style-type: none"> ▪ Primary source for the textile industry, commanding two-thirds of India's total textile fibre consumption. ▪ Cottonseed oil and cake/meal are used for cooking and as feed for livestock and poultry. <ul style="list-style-type: none"> ◦ Cottonseed oil is India's third-largest domestically-produced vegetable oil. ▪ Cotton is one of India's most important commercial crops, accounting for approximately 25% of global cotton production. ▪ It is often referred to as "White-Gold" due to its economic significance.
Initiatives	<ul style="list-style-type: none"> ▪ Kasturi cotton ▪ Minimum Support Price (MSP) ▪ Cotton Corporation of India (CCI) ▪ National Food Security Mission-Commercial Crops (NFSM-CC)



Cotton Cultivation

India got **1st** place in the world in cotton acreage with **130.61** lakh hectares area under cotton cultivation i.e. around **40%** of the world area of **324.16** lakh hectares.

India is the only country which grows all four species of cotton



G. Arboreum and
G. Herbaceum
(Asian cotton)

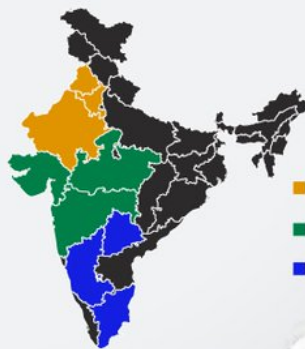


G. Barbadense
(Egyptian cotton)



G. Hirsutum
(American Upland cotton)

Major 9 cotton growing states divided according to Agro-Ecological zones



■ Northern Zone
■ Central Zone
■ Southern Zone



Drishti Mains Question:

Q. Evaluate the challenges faced by cotton farmers and examine the importance of crop diversification and sustainable agricultural practices in ensuring food and income security.

UPSC Civil Services Examination Previous Year Question (PYQ)

Prelims

Q1. The black cotton soil of India has been formed due to the weathering of (2021)

- (a) brown forest soil
- (b) fissure volcanic rock
- (c) granite and schist
- (d) shale and limestone

Ans: (b)

Q2. A state in India has the following characteristics: (2011)

1. Its northern part is arid and semi-arid.
2. Its central part produces cotton.
3. Cultivation of cash crops is predominant over food crops.

Which one of the following states has all of the above characteristics?

(a) Andhra Pradesh

(b) Gujarat

(c) Karnataka

(d) Tamil Nadu

Ans: (b)

Mains

Q. Analyse the factors for the highly decentralised cotton textile industry in India.

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