



# **THE CURSE OF COTTON: CHALLENGES POSED BY PINK BOLLWORM**

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## INTRODUCTION:

Indian cotton farmers are currently grappling with significant losses in their cotton crops due to the relentless attacks of the pink bollworm (*Pectinophora gossypiella*). This pest has evolved to resist the genetically modified Bt cotton hybrids, particularly the Bollgard I and Bollgard II varieties, rendering them less effective in controlling the bollworm population. The infestation typically begins during the flowering stage, where the early-stage larvae feed on the cotton pollen. This feeding behaviour results in the formation of webbing around the pollen grains and causes the development of rosette flowers, which are deformed and fail to produce viable seeds. As the larvae mature, they enter the cotton bolls and continue feeding on the seeds inside, leading to rotting and a significant reduction in crop yield.

## REASONS FOR THE HEAVY INCIDENCE OF PINK BOLLWORM INFESTATION

The prevalence of pink bollworm in cotton fields can be attributed to several key factors:

### 1. Concealed Damage Within the Bolls:

One of the primary reasons for the widespread damage caused by pink bollworm is that the pest remains hidden inside the cotton bolls. This makes the damage difficult to detect until it's too late, as the infestation only becomes apparent once the boll is opened.

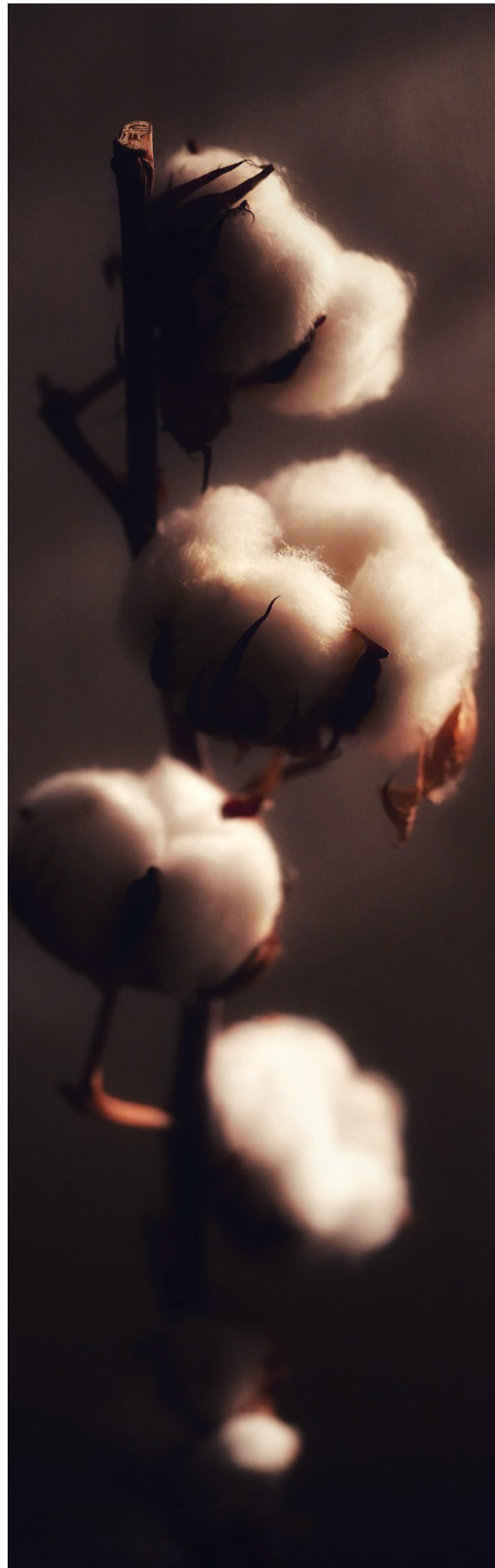
### 2. Mono-cropping Without Refugia Strategy:

The practice of growing Bt cotton as a monoculture, without implementing a refugia strategy (i.e., planting non-Bt cotton to sustain natural predators), exacerbates the problem. This



allows the pink bollworm population to thrive unchecked, as the pest primarily targets Bt cotton, where it can survive and reproduce.

3. **Delayed Harvesting:** Many farmers extend the cotton harvest season beyond January, sometimes into February and March. This delayed harvesting provides the pink bollworm larvae with more time to mature and cause further damage to the crop, increasing the pest population and reducing yields.
4. **Retention of Crop Residues:** Leaving cotton crop residues in the field and providing irrigation after harvest allows the pink bollworm to overwinter and continue its life cycle, leading to a carryover effect into the next growing season. This increases the pest population year after year.
5. **Lack of Proper Management in Ginning Mills:** Inadequate pest management practices at ginning mills also contribute to the spread of pink bollworm. Cotton bolls that are infested with larvae are often not properly sanitized before processing, allowing the pest to be transported to other regions and exacerbating the infestation problem.
6. **Overuse of Insecticides:** The continuous and excessive application of high-dose insecticides has created a scenario where the pink bollworm has developed resistance to these chemicals. This over-reliance on chemical controls without integrated pest management (IPM) strategies leads to ineffective control and greater pest resilience.
7. **Neglect of Alternate Hosts:** The pest is not exclusive to cotton. It can also feed on alternate hosts such as Abutilon (a common weed). If these alternative plants are not managed or controlled, they can serve as a breeding ground for the pink bollworm, further complicating pest management efforts.





# EFFECTIVE MANAGEMENT STRATEGIES

To mitigate the impact of pink bollworm and prevent further losses, farmers can implement several strategic approaches:

- 1. Adopt Short-Duration Cotton Varieties:** Growing short-duration cotton varieties and hybrids can help reduce the time the crop is susceptible to bollworm attacks. These varieties mature faster, limiting the window of opportunity for pests to inflict damage.



**Rosette flowers**

- 2. Practice Crop Rotation:** Rotating cotton with non-host crops (such as legumes or cereals) helps break the life cycle of the pink bollworm, reducing the chances of pest build up in the soil and surrounding environment.
- 3. Plant Non-Bt Cotton Alongside Bt Cotton:** Growing non-Bt cotton along with Bt cotton is a key component of the refugia strategy. This practice helps maintain natural populations of beneficial insects, which can control bollworm numbers, and reduces the selection pressure on the pest population, preventing the development of resistance.
- 4. Timely Harvesting and Disposal of Crop Residues:** Harvesting cotton by January, when the bollworm population is at its lowest, and properly disposing of or burning crop residues can significantly reduce the pest's ability to overwinter and survive until the next season.



**Damaged bolls**

- 5. Sanitation in Ginning Mills:** Ginning mills should be equipped with proper sanitation procedures to ensure that cotton bolls infested with pests are not processed or spread to other regions. This includes burning leftover cotton in the ginning facilities and using pheromone traps to monitor pest populations and identify infestations early.
- 6. Implement Integrated Pest Management (IPM):** An IPM approach combines multiple control strategies, including biological controls, mechanical methods (like handpicking), and the judicious use of pesticides. By applying IPM throughout the growing season—from sowing to harvest—farmers can maintain a balanced ecosystem and minimize reliance on chemical insecticides.
- 7. Rotate Insecticides:** To manage pesticide resistance, farmers should rotate insecticides with different modes of action. This prevents the development of resistance in the pink bollworm population and ensures the continued effectiveness of chemical control methods.