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Pests of Cotton: Nature of Damage and Control

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Cotton (*Gossypium* spp.) is a vital fiber and cash crop that supports the livelihood of millions of farmers in India and across the world. However, its productivity is often reduced due to heavy pest infestations. A wide variety of insect pests attack cotton during its vegetative and reproductive stages, causing severe yield losses and quality degradation. This article highlights the major pests of cotton, their nature of damage, and suitable control measures, with special reference to the Armyworm (*Spodoptera litura*)—its taxonomy and management strategies.

Cotton, often referred to as the "white gold" of India, plays a crucial role in the textile industry and rural economy. Despite its economic importance, cotton is highly vulnerable to pest attacks due to its long growing season and the abundance of tender plant parts. These pests cause substantial economic losses to farmers every year. Over-dependence on chemical pesticides has led to pest resistance, resurgence, and ecological imbalance. Therefore, the adoption of Integrated Pest Management (IPM) practices has become essential for sustainable cotton cultivation.

Major Pests of Cotton and Their Nature of Damage

1. Bollworm Complex (*Helicoverpa armigera*, *Earias vittella*, *Pectinophora gossypiella*)

- **Nature of Damage:** Larvae bore into squares, flowers, and bolls, feeding on developing seeds and lint. This leads to shedding, boll rot, and poor-quality fiber.
- **Symptoms:** Holes in bolls with excreta and shedding of fruiting bodies.

2. Aphids (*Aphis gossypii*)

- **Nature of Damage:** Aphids suck sap from tender leaves and shoots, causing leaf curling, yellowing, and stunted growth.
- **Indirect Damage:** Secretion of honeydew promotes sooty mold development, reducing photosynthetic efficiency.

3. Jassids (*Amrasca biguttula biguttula*)

- **Nature of Damage:** Both nymphs and adults suck sap from the undersides of leaves, resulting in yellowing, curling, and "hopper burn."

- **Symptoms:** Brown leaf margins, reduced plant vigor, and decreased yield.

4. Whiteflies (*Bemisia tabaci*)

- **Nature of Damage:** Whiteflies suck sap from the lower leaf surfaces, causing leaf curling and premature defoliation.
- **Indirect Damage:** Transmit Cotton Leaf Curl Virus (CLCuV), resulting in heavy yield losses.
- **Symptoms:** Sticky leaves covered with black sooty mold.

5. Armyworms (*Spodoptera litura*)

- **Order:** Lepidoptera
- **Family:** Noctuidae
- **Nature of Damage:** The larvae feed gregariously on foliage, leading to severe defoliation under heavy infestations.
- **Symptoms:** Skeletonized leaves, heavy defoliation, and reduced photosynthetic activity causing yield reduction.

Control Measures

A. Cultural Control

- Deep summer ploughing to expose and destroy pupae.
- Crop rotation with non-host crops to break pest life cycles.
- Timely sowing to avoid peak pest infestation periods.
- Destruction of crop residues and weeds that serve as pest reservoirs.

B. Mechanical Control

- Regular field monitoring and handpicking of larvae and egg masses.
- Use of pheromone traps (5–10 per hectare) for pest monitoring.
- Installation of light traps to attract and kill adult moths.

C. Biological Control

- Release of egg parasitoids such as *Trichogramma chilonis* to control bollworms.
- Use of predators like *Chrysoperla carnea* (green lacewing) and ladybird beetles.
- Application of bio-pesticides like *Bacillus thuringiensis* (Bt) and neem-based formulations (*Azadirachta indica* extracts).
- Conservation of natural enemies through judicious pesticide use.

D. Chemical Control

- Application of selective insecticides such as quinalphos, chlorpyrifos, emamectin benzoate, or indoxacarb at recommended doses.
- Rotation of insecticides with different modes of action to prevent resistance development.
- Avoid indiscriminate spraying; follow Economic Threshold Levels (ETL).

E. Integrated Pest Management (IPM)

- Integration of cultural, biological, and chemical control methods for sustainable pest suppression.
- Regular pest monitoring and threshold-based interventions.
- Adoption of Bt cotton varieties for bollworm resistance, maintaining refugia to delay resistance development.
- Farmer training in pest identification and safe pesticide handling.

Conclusion

Cotton pests pose a major challenge to sustainable cotton production. The adoption of eco-friendly pest management strategies—especially biological control and IPM—is crucial to maintain soil health, crop yield, and environmental quality. Reducing dependency on chemical pesticides helps preserve biodiversity and ensures long-term agricultural sustainability. Effective control of key pests such as the Armyworm (*Spodoptera litura*) can significantly enhance the productivity and fiber quality of cotton in India.

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