



Pests of Wheat: Identification and Management

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Wheat (*Triticum aestivum* L.) is one of the most vital staple food crops cultivated worldwide, playing a critical role in global food security. It serves as a primary source of calories and protein for a significant portion of the human population, particularly in developing countries. Despite advancements in agronomic practices and the development of high-yielding varieties, wheat production remains vulnerable to a wide array of biotic stresses, with insect pests posing one of the most persistent and damaging threats. These pests not only reduce grain yield but also adversely affect quality, leading to considerable economic losses for farmers and threatening national food supplies.

This article provides a comprehensive overview of the major insect pests affecting wheat crops, including their morphological identification features, biology, symptoms of infestation, and the extent of damage they cause at various crop stages. Key pests such as aphids, armyworms, shoot flies, termites, and cutworms are discussed in detail, highlighting their impact on plant health and productivity.

Emphasis is placed on the importance of Integrated Pest Management (IPM) as a sustainable and environmentally sound approach to pest control. The review explores a combination of management strategies, including biological control agents (e.g., parasitoids and predators), cultural practices (e.g., crop rotation, timely sowing, and sanitation), and the judicious use of chemical pesticides when necessary. Particular focus is given to eco-friendly pest management techniques that minimize harm to non-target organisms, reduce pesticide residues in the environment, and support long-term pest suppression.

Introduction

Wheat (*Triticum aestivum* L.) is one of the most important cereal crops globally, serving as a staple food for a significant portion of the world's population. It plays a vital role in ensuring global food security and providing nutritional sustenance, particularly in developing countries. Cultivated under a wide range of agro-climatic conditions, wheat has demonstrated remarkable adaptability, making it a preferred crop in many parts of the world. Among the major wheat-producing nations, India holds a prominent position, ranking second only to China in terms of total production. The Indo-Gangetic Plains, covering parts of Punjab, Haryana, Uttar Pradesh, and Bihar, form the heartland of wheat cultivation in India and contribute substantially to the national food grain reserves.

Despite advancements in agronomic practices and the development of high-yielding varieties, wheat production continues to face significant challenges. One of the most pressing issues is the damage caused by insect pests. These pests pose a serious threat throughout the crop growth cycle, from sowing to storage, and can lead to substantial yield losses if not effectively monitored and managed. It is estimated that insect pests alone can be responsible for 20–30% reduction in wheat yield under severe infestation conditions. Some of the most common pests affecting wheat include the wheat aphid (*Schizaphis graminum*), shoot fly (*Atherigona* spp.), armyworm (*Mythimna separata*), and termites (*Odontotermes* spp. and *Microtermes* spp.), among others.

Major Pests of Wheat and Their Identification

1. Termites (*Odontotermes* spp. and *Microtermes* spp.)

• Termites are soil-inhabiting insects that attack wheat from germination to maturity. They feed on roots and stems, causing wilting and drying of plants. Infestation is more common in light-textured and poorly irrigated soils.

2. Aphids (*Rhopalosiphum maidis*, *Sitobion avenae*)

• Aphids are small, soft-bodied insects that suck sap from the leaves and earheads. They appear in colonies on tender plant parts, causing curling and yellowing of leaves. They also transmit viral diseases such as the Barley Yellow Dwarf Virus (BYDV).

3. Armyworm (*Mythimna separata*)

• The armyworm is a caterpillar that feeds voraciously on leaves during the night. It causes skeletonization of foliage and may cut the earheads in severe infestations. Outbreaks occur during cool and humid weather.

4. Wheat Shoot Fly (*Atherigona naqvii*)

• The shoot fly attacks young seedlings, laying eggs on the leaves. The maggots enter the stem and destroy the central shoot, causing a characteristic 'dead heart' symptom.

5. Wheat Stem Borer (*Scirpophaga excerptalis*)

• The larvae bore into the stem and feed internally, weakening the plant structure. Infested plants show dead heart symptoms, reduced tillering, and poor grain filling.

6. Root Aphids and Cutworms

• Root aphids damage underground plant parts, while cutworms cut the seedlings near the ground level, resulting in patchy crop stands.

Integrated Pest Management (IPM) Strategies

1. Cultural Control: Deep summer ploughing, timely sowing, crop rotation, and destruction of infested residues help in minimizing pest population build-up.

2. Mechanical Control: Collection and destruction of egg masses, larvae, and pupae manually.

3. Biological Control: Release of natural enemies such as ladybird beetles (for aphids) and parasitoids like *Trichogramma chilonis* for stem borers.

4. Chemical Control: Seed treatment with chlorpyrifos or imidacloprid before sowing. Foliar application of insecticides such as dimethoate or thiamethoxam during pest outbreaks.

5. Resistant Varieties: Growing pest-tolerant wheat varieties recommended by agricultural research institutions.

6. Integrated Approach: Combining biological, cultural, and chemical methods ensures sustainable pest control.

Conclusion

Effective pest management in wheat cultivation is a multifaceted challenge that necessitates an integrated and strategic approach. Given the substantial yield losses that insect pests can inflict—ranging from seedling damage to post-harvest deterioration—it is imperative that control measures are implemented in a timely and systematic manner. Successful pest management hinges on early monitoring, accurate identification of pest species, understanding their life cycles and behavior, and applying appropriate and targeted control strategies. Delayed or improper interventions not only reduce crop yields but can also exacerbate pest outbreaks, leading to increased dependency on chemical pesticides.

To address these challenges sustainably, the adoption of Integrated Pest Management (IPM) practices is essential. IPM emphasizes the combination of cultural, biological, mechanical, and chemical methods in a way that minimizes environmental impact, preserves beneficial organisms, and ensures long-term control of pest populations. Eco-friendly approaches, such as crop rotation, the use of resistant wheat varieties, habitat management, and the conservation of natural predators, contribute significantly to maintaining the ecological balance while protecting the crop. When chemical control becomes necessary, it

should be judicious, based on economic threshold levels, and compliant with recommended safety standards to prevent resistance development and environmental contamination.

Equally important is enhancing the awareness and knowledge of farmers regarding pest dynamics and modern pest control technologies. Capacity-building initiatives, extension services, and access to timely information can empower farmers to make informed decisions that optimize pest management outcomes. Promoting farmer education in the principles of IPM, the correct use of biological agents, and the safe handling of pesticides will play a pivotal role in improving both productivity and profitability in wheat farming.

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