

# Integrated Pest Management - Wheat

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## ABSTRACT

*In India, wheat is ranked as the second most important grain crop. Particularly significant in the north-western regions, it serves as main food crop in these areas. India is the second-biggest producer of wheat in the world. Contributing approximately 14% of the wheat produced worldwide. This highlights the substantial role wheat plays in India's agricultural landscape and its significant impact on the world's overall wheat output, but due to various pests on wheat, the production is decreasing, let us see in this article how to identify and control various pests in wheat crop. A variety of bugs are beginning to rear their heads on wheat crops these days. It includes Termites, Wheat stem sawfly, pink borer, Armyworm, Brown wheat mites, Ghujhia weevil, Spider etc. If all these pests are controlled in time, many of our problems will end. We can use many methods to control the above-mentioned pests.*

**Keywords** – biological control, cultural practices, chemical control, insect-pest, Larvae.

## INTRODUCTION

After China, India is the world's second-biggest producer of wheat (*Triticum aestivum* L.). (Singh B. and Jasrotia P., (2020). Wheat is a staple cereal crop widely cultivated for its grains, which serve as a major food source for a significant portion of the world's population. It belongs from the grass family (*Poaceae*) and is a critical component of global agriculture. Wheat is versatile and can be used for various purposes, including the production of flour for bread, pasta, and other food products. There are different varieties of wheat, categorized broadly into winter and spring wheat, based on their planting season. It undergoes distinct growth stages, from germination to flowering, grain development, and finally, harvest.

Wheat cultivation faces challenges from various pests and diseases, as well as environmental factors. Effective management practices, including Integrated Pest Management (IPM) and disease-resistant varieties, are crucial for ensuring healthy and productive wheat crops.

The significance of wheat in human nutrition and its role in global food security make it a focal point for agricultural research and innovation. Advances in wheat breeding, genetic engineering, and sustainable farming practices aim to enhance yields, nutritional content, and resilience to environmental stressors. With around one-third of the world's grain production coming from wheat, rice is the second most significant crop.

It's a center of origin is believed to be in Southwestern Asia. The spread of wheat to India by the Aryans and its cultivation in ancient China, as well as its knowledge in Egypt and Switzerland during the Stone Age, highlights its global significance throughout (<http://www.icar.org.in/dwr/dwrmain.htm>)

### 1. Wheat stem sawfly - (*Cephus cinctus*)



- This insect is small in size like a housefly. It is gray in color and has 4 to 5 leaflets on its lower side.
- Full grown larvae are 10 to 12 cm. It is long and tapers towards the mouth. Its color is yellowish and it has no legs. This pest also infests some grasses like sorghum, millet, maize and other cereals.
- After hatching from the eggs, the larvae eat their way into the flower buds by boring holes in the stalk. Therefore, the middle growing part of the flower turns yellow in the beginning. (*Akbar et al., 2023*).
- Small plants die completely due to predominance of this pest while large plants burst laterally, hence it decreases productivity.

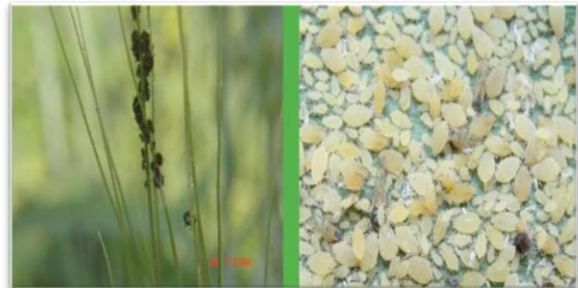
history. wheat plays a crucial role in India's diet, contributing significantly to both dietary protein and calorie intake. The emphasis on increasing yields reflects the ongoing effort to fulfill the nutritional needs of the population. (*Hansa et al., 2020*)

### 2. Pink borer – (*Sesamia inferens*)



- The larvae are purplish pink in color and adult moth is straw-colored with white wings.
- When larvae feed on the central shoot, they cause the developing point to dry up and the creation of a "dead heart" in the young plant. Occasionally, the bottom internodes display incisions that resemble rings. (*Umer et al., 2018*).
- "White ears" appear during the ear head stage, and severe damage breaks the stem.

### 3) Brown wheat mites – (*Petrobia latens*)



- Adults are quite tiny, metallic brown to black, with light yellow legs, whereas nymphs are yellowish in color.

- When mite numbers are high, leaves may take on a golden look, and in certain cases, they may even die from being sucked dry by two stylets that resemble needles. (*Shrivastava et al., 2014*).
- Mites have a tendency to feed on the uppermost portion of the leaves.
- The sap of leaves, leaf sheaths, green stems, and spikes is sucked by mite nymphs and adults. (*Shrivastava et al., 2014*).
- Fields that are heavily infected seem scorched and withered.

#### 4) Armyworm - (*Mythimna separata*)



- Larvae are dull white when they first emerge, then become tum green. They are quite active. (*Umer et al., 2018*).
- Larvae hide in cocoons during the day. At night, they emerge from cocoon and eat the leaves. The larvae exhibit voracious feeding behavior, migrating between fields and displaying a preference for feeding during dawn and dusk, avoiding direct sunlight. (*Nikhil R., 2020*).
- Initially targeting tender leaves in the central whorl, they progressively consume older leaves, completely skeletonizing them.
- If the infestation is heavy, only the leaf veins remain.

- Armyworms attack the whole crop in one field and move to another field like an army. (*Umer et al., 2018*).

#### 5) Gram Pod Borer - (*Helicoverpa armigera*)



- After feeding on the leaves for a while, the immature larva assaults the heads of the ears. (*Nikhil R., 2020*).
- Internal tissues are entirely eaten away.
- The gram pod borer poses a threat to wheat during maturity, indicating a potential risk to the crop at a crucial stage of development.

#### 6) Termites – (*Odontotermes obesus*)



- Once the crop is sown and occasionally close to maturity, this pest causes damage.
- It eats plant roots, developing plant stems, trunks, and even decomposing cells. (*Nikhil R., 2020*).
- This causes the plants to die and are easily pulled out. (*Umer et al., 2018*).

- The buds become white if the infestation is severe.
- Infestation is high in arable fields and those fields who filed with partially decomposed cow dung.

### 7) Spider (*Steatoda triangulosa*)



- The insect is very small, shiny brown to black in color with legs are pale yellow. (Nikhil R., 2020).
- They absorb sap from young leaves. Hence the white spots on the leaf appear. If the infection is heavy, the leaves turn red and become dry.

### 8) Ghujhia weevil (*Tanymecus indicus*)



- Weevil is earthen grey color. They have oblong forewings and roughly triangular hind wings; however, they are not able to fly. (Umer et al., 2018).
- Only the adult weevils do the damage, and they only sever the seedlings at the ground level.

- Adults consume the host plant's leaves and tender shoots. (Nikhil R., 2020).
- The damage is particularly serious during crops are germinating.

## Integrated Pest Management

### i. Cultural practices

- ✓ Stay away of late wheat growing to protect the crop against shoofly & armyworm damage. (Pawar A. D.)
- ✓ Use the recommended dose of nitrogen fertilizers, as the higher levels in attract higher population of armyworms and aphids.
- ✓ For termite control, prefer seed treatment. It's cheap and effective and also cause the less pollution.
- ✓ Always use well rotten farm yard manure to avoid damage by termites.
- ✓ For effective pest control follow Crop rotation.

### ii. Biological control

- ✓ Release *Trichogramma* sp. @50,000 / ha for pink borer and armyworm control.
- ✓ Conservation and exploitation of biological control agent like *Coccinellid* beetles, *Chrysopa*, *Syrphid* flies, *Cotesia* sp., etc.
- ✓ 5% Neem seed kernel extracts should be sprayed for the effective control of pest.



### iii. Chemical control

- ✓ It is recommended to use chemical insecticide only when the pest population has above the economic threshold levels (ETL).
- ✓ Termites - Apply 4 ml/kg of chlorpyrifos to the seed before planting for effective termite control.
- ✓ Termite colony in termitarium destroyed by using crude oil emulsion.
- ✓ Armyworm - Use a spray of chlorpyrifos 20 EC 80ml and 20 lit of water for efficient control.
- ✓ Wheat mites - Spray formothion, oxydemeton methyl, or phosphomidon @ 250 g a.i./ha for an effective control.
- ✓ Ghujhia weevil – For the efficient management of weevil dust carbaryl or malathion 5 % @ 25 kg/ha.
- ✓ Gram Pod borer – Apply 2.0 L of quinalphos 25 EC or 3 kg of carbaryl 50 WP in 500 L of water per hectare.
- ✓ Pink borer – For efficient control, apply 20 EC @ 250g a.i. /ha of chlorpyrifos in 500 litres of water. Or use a power sprayer to apply 30 litres of water or a knap-sack sprayer to apply dimethoate (30EC) at 150 ml per acre. After 15 days, reapply the spray if needed.

*{Note - Chemical insecticides should be used as recommended only after a regular survey of the crop and ensuring that the pest population is above the economic loss level.}*



### Acknowledgment

*All the above information was obtained from the, authentic books, various research papers and different official website of the government, various universities. The main objective is to convey information to as many agricultural producers as possible.*

### Conclusion

A comprehensive approach to insect pest management, taking into account ecological and social impacts, involves the synergistic use of cultural, biological, chemical, physical, and biotechnological control methods. This integrated strategy is key to achieving sustainable and effective pest management in various agricultural fields. The development of pest-resistant wheat varieties through ongoing research holds great promise in minimizing the impact of pests on yields. As these technologies advance, their increasing importance is likely to contribute significantly to global food security by enhancing the resilience of crucial crops like wheat.

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