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Major Insect Pests of Chilli and Their Integrated Management

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Chilli (*Capsicum annuum* L.) is an important spice crop cultivated widely in India for its economic and nutritional value. However, its production is adversely affected by several insect pests, including thrips, mites, aphids, whiteflies, fruit borers, and cutworms. These pests cause significant losses in yield and fruit quality through direct feeding and transmission of plant diseases. Effective management of these pests requires an integrated approach involving cultural, mechanical, biological, and chemical control measures. Adoption of Integrated Pest Management (IPM) practices helps minimize pest damage, reduce pesticide dependence, and ensure sustainable chilli production.

Keywords: *Capsicum annuum*, IPM, Pesticide

Introduction

Chilli (*Capsicum annuum* L.) is one of the most important spice and vegetable crops cultivated in India. It is widely used in daily diets for its characteristic pungency, colour, flavour, and nutritional value. The pungency of chilli is attributed to capsaicin, an alkaloid that also possesses antioxidant and medicinal properties (Jagtap *et al.*, 2012). Chilli is believed to have originated in Mexico and was introduced to India by Portuguese traders during the sixteenth century. Today, India is one of the leading producers, consumers, and exporters of chilli in the world. Major chilli-growing states include Andhra Pradesh, Maharashtra, Karnataka, Tamil Nadu, Odisha, Bihar, Uttar Pradesh, and Rajasthan. Despite its economic importance, chilli cultivation faces serious challenges from a number of insect pests throughout the crop growth period. Important pests such as thrips, aphids, whiteflies, mites, and fruit borers cause significant losses by damaging leaves, flowers, and fruits, resulting in reduced yield and quality (Subhashree *et al.*, 2020). Therefore, proper pest identification and adoption of integrated pest management (IPM) strategies are essential for sustainable chilli production and higher economic returns to farmers.

Distribution and status

In India, major chilli-growing states include Andhra Pradesh, Telangana, Karnataka, Maharashtra, Tamil Nadu, Odisha, Bihar, Uttar Pradesh, and Rajasthan. Chilli was grown in an area of 30.84 thousand hectares and produced about 75.35 thousand MT with productivity of 2.44MT ha-1 in Uttar Pradesh (Anonymous 2023).

Host range

Besides chilli, they attack crops such as tomato, brinjal, potato, okra, cotton, tobacco and several weeds which serve as Alternet host and help in their survival throughout the year.

The major insect pests affecting chilli production are described below:

Table 1: Major Insect Pests Affecting Chilli Crop

S.No.	Pest	Damaging stage	Infected part
1	Thrips	Nymph and Adult	Leaf
2	Mite	Nymph and Adult	Leaf
3	Aphids	Nymph and Adult	Leaf
4	Fruit Borer	Caterpillar	Leaf
5	Whitefly	Nymph	Leaf
6	Cutworm	Caterpillar	Leaf

Thrips (*Scirtothrips dorsalis*)

Thrips is one of the most destructive pests of chilli. The adults are yellowish-brown in colour, while the nymphs are pale yellow. Both nymphs and adults damage the crop by sucking sap from leaves, tender shoots, and flower buds. Infested leaves curl upward and develop a boat-shaped appearance. Under severe infestation, plant growth is stunted, leaves become crinkled and distorted, and the plants gradually weaken, resulting in reduced yield (Chintkuntlawar *et al.*, 2015). Thrips also serve as vectors of several plant viruses. A major portion of the damage caused by thrips is associated with the transmission of viral diseases, particularly Tomato Spotted Wilt Virus (TSWV). In addition, thrips are important vectors of Peanut Bud Necrosis Disease (PBND) in groundnut. Their ability to transmit plant pathogens makes them one of the most economically important pests in chilli cultivation.

Yellow Mite (*Polyphagotarsonemus latus*)

Yellow mite is another serious pest of chilli that causes considerable damage to the crop. The mites are minute, orange-yellow in colour, and possess dark markings on both sides of the body. They usually inhabit the lower surface of leaves and feed by sucking plant sap. As a result of feeding, the leaves become distorted, crinkled, and curl downward. Severe infestation leads to stunted plant growth, deformation of young leaves and shoots, and a reduction in yield and fruit quality. The pest is particularly damaging during warm and humid weather conditions.

Aphid (*Aphis gossypii* Glover)

Aphids are small, soft-bodied insects that are generally green in colour. They can be identified by the presence of a pair of tube-like structures called cornicles on the fifth and sixth abdominal segments. Both nymphs and adults feed by sucking sap from leaves, tender shoots, and other succulent plant parts. During feeding, aphids secrete a sugary substance known as honeydew, which promotes the growth of black sooty mould on leaves and fruits. This black coating interferes with photosynthesis and reduces the market quality of the produce. In addition to direct damage, aphids also act as vectors of several viral diseases, including mosaic disease, thereby causing further losses in chilli production.

Fruit Borer (*Spodoptera litura Fabicius*)

The larvae are dark brown to black in colour and damage chilli fruits by boring into them and feeding internally. Infested fruits show circular holes and often drop prematurely. Severe infestation causes heavy yield losses and reduces fruit quality. Early detection and timely management are essential to prevent economic damage.

Whitefly (*Bemisia tabaci*)

Both nymphs and adults of whitefly feed by sucking sap from the lower surface of leaves, which adversely affects plant growth and vigour. In addition to direct damage, this pest also acts as a vector of several plant viral diseases.

Cutworm

Cutworms damage the crop by cutting young plants at the ground level during night hours, causing the plants to wilt and dry completely. The larvae are dark-coloured and smooth-bodied, and they remain hidden in the soil or beneath soil clods during the daytime.

Pest Management

Cultural control

- Timely sowing helps reduce the incidence of fruit borers.
- Regular weeding and intercultural operations should be carried out, as weeds often harbor pupae and larvae.
- Deep ploughing exposes pupae to natural enemies and desiccation, leading to their death.
- Follow crop rotation with crops such as chickpea and pigeon pea.
- Use pest-resistant varieties such as Pusa Jwala and Kashi Gaurav against thrips.
- Apply balanced doses of fertilizers; excessive nitrogen application increases the population of whiteflies and aphids.

Mechanical control

- Remove and destroy infested plant parts, which can help prevent **50–60% fruit damage**.
- Hand collection and destruction of eggs and larvae is an effective method of pest control.
- Castor can be grown on field bunds or along the borders of chilli fields as a trap crop, as egg-laying moths can be attracted and destroyed on castor plants.
- Install pheromone traps @ 5 traps per hectare for monitoring adult *Helicoverpa armigera* moths.
- Yellow and blue sticky traps help reduce the population of thrips and aphids.

Biological Control

Predators

- Ladybird beetle – feeds on aphids.
- *Chrysoperla* – feeds on thrips.

Parasitoids

- *Trichogramma chilonis* – useful for destroying the eggs of fruit borers.
- For larval control, spray HaNPV @ 1.5g (10^{12} POB) per hectare mixed with 300 g cottonseed oil per hectare.
- Application of vermicompost @ 2500 kg/ha and neem cake @ 500 kg/ha is useful in controlling aphids without affecting their natural enemies.

Chemical control

- Spray neem oil @ 5 ml per litre of water during the initial stage of pest infestation.
- For the management of thrips, spray Fipronil 5% SC @ 2 ml/litre of water. For whitefly control, spray Diafenthiuron 50% WP @ 1 g/litre or Acetamiprid @ 0.2 g/litre of water.
- Treat seeds with Imidacloprid @ 3 g/kg seed. Thereafter, spray Imidacloprid 17.8% SL @ 3 ml/10 litres of water or Fipronil 5% SC @ 1.5 ml/litre of water to reduce damage caused by thrips.

Conclusion

Insect pests are major constraints to profitable chilli cultivation. Timely identification of pest incidence and adoption of integrated pest management practices can effectively reduce crop losses and improve yield and quality. Combining cultural, biological, mechanical, and need-based chemical measures offers an environmentally safe and sustainable approach to chilli pest management.

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