

Major Insect Pests of Spices and Condiments

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Spices and condiments are integral to global cuisine, traditional medicine, and the food processing industry. India is one of the largest producers and exporters, accounting for more than 70% of global spice trade. However, the cultivation and storage of these high-value crops are threatened by a wide spectrum of insect pests that reduce yield, compromise quality, and affect export potential. In the field, insect pests such as borers, thrips, aphids, and sap-sucking insects cause severe losses to chili, black pepper, cardamom, turmeric, ginger, coriander, cumin, fennel, and fenugreek. In addition, stored spices are highly susceptible to beetles and moths which cause contamination, weight loss, and deterioration of aroma and flavor. This article provides an in-depth account of the major insect pests of spices and condiments, their taxonomy, biology, host preference, damage symptoms, and economic significance. Finally, the importance of Integrated Pest Management (IPM) strategies for sustainable production and storage is highlighted.

Introduction

Spices and condiments are vital agricultural commodities valued for their flavour, aroma, and medicinal properties. India, known as the “Spice Bowl of the World,” contributes significantly to global spice production and export. However, their cultivation and storage face severe challenges due to insect pests, which cause both yield reduction and quality deterioration. Field pests such as thrips, aphids, and borers damage plants, while storage pests like beetles and moths reduce seed quality and market value. Understanding the biology, host range, and management of these pests is crucial for ensuring sustainable production and maintaining export standards of spices.

1. Chilli (*Capsicum annuum* and *Capsicum frutescens*)

a) Fruit Borer (*Helicoverpa armigera*)

Order: Lepidoptera

Family: Noctuidae

Host range: Polyphagous, feeding on tomato, pigeon pea, cotton, and several vegetables.

Biology: The adult is a brownish moth; females lay eggs singly on flowers or young fruits.

Caterpillars are greenish with dark stripes, highly voracious, and pass through 5–6 instars.

Damage: The caterpillars bore into tender fruits and feed on the internal contents, leaving circular holes. Damaged fruits often rot due to secondary infection. Yield losses can range from 30–60% under severe infestation.

b) Thrips (*Scirtothrips dorsalis*)

Order: Thysanoptera

Family: Thripidae

Biology: Small, slender insects with fringed wings. Both nymphs and adults are sap suckers.

They thrive in hot and dry weather.

Damage: Infestation causes upward leaf curling, silvery streaks, and flower drop. Flowers and young pods fail to develop properly.

2. Black Pepper (*Piper nigrum*)

a) Pollu Beetle (*Longitarsus nigripennis*)

Order: Coleoptera

Family: Chrysomelidae

Biology: The female lays eggs on developing pepper berries. The grubs bore inside and feed on internal tissues.

Damage: Infested berries become hollow, dry, and fall off prematurely, a condition locally called 'pollu disease.' Economic losses may reach up to 40% in unmanaged fields.

b) Top Shoot Borer (*Cydia hemidoxa*)

Order: Lepidoptera

Family: Tortricidae

Damage: The larvae bore into tender terminal shoots, causing wilting and drying. In severe cases, inflorescences are also attacked, reducing fruit setting. This pest directly affects vine growth and pepper yield.

3. Cardamom (*Elettaria cardamomum*)

a) Capsule Borer (*Conogethes punctiferalis*)

Order: Lepidoptera

Family: Crambidae

Biology: Female moths lay eggs on developing cardamom capsules. Caterpillars bore inside and feed on seeds, contaminating capsules with frass.

Damage: Infested capsules dry up prematurely, lose aroma, and become unfit for marketing.

b) Cardamom Thrips (*Sciothrips cardamomi*)

Order: Thysanoptera

Family: Thripidae

Damage: Thrips infest leaves, flowers, and developing capsules. Attacked capsules develop corky ridges, fail to fill with seeds, and produce low-quality spice. Severe infestation causes more than 40% yield reduction.

4. Turmeric (*Curcuma longa*) and Ginger (*Zingiber officinale*)

a) Shoot Borer (*Conogethes punctiferalis*)

Order: Lepidoptera

Family: Crambidae

Damage: Caterpillars bore into pseudostems, leading to 'dead heart' symptoms. The central shoot dries and withers. Yield losses up to 60% have been reported.

b) Rhizome Scale (*Aspidiella hartii*)

Order: Hemiptera

Family: Diaspididae

Damage: This pest attacks rhizomes in the field and in storage. Infested rhizomes appear shriveled, discolored, and light in weight. This reduces market quality and germination potential for the next season.

5. Coriander (*Coriandrum sativum*)

Aphid (*Hyadaphis coriandri*)

Order: Hemiptera

Family: Aphididae

Biology: Aphids reproduce both sexually and parthenogenetically, allowing rapid population buildup.

Damage: They colonize umbels and developing seeds, sucking sap and causing poor seed set. Aphids also act as vectors of mosaic viruses, compounding losses.

6. Cumin (*Cuminum cyminum*)

Seed Bug (*Nysius indicus*)

Order: Hemiptera

Family: Lygaeidae

Damage: Nymphs and adults feed directly on developing seeds, causing shriveling, browning, and weight loss. Such seeds fetch lower prices in markets and may not be suitable for export.

7. Fennel (*Foeniculum vulgare*) and Fenugreek (*Trigonella foenum-graecum*) Aphids (*Aphis gossypii* and *Aphis craccivora*)

Damage: Aphid colonies infest leaves, stems, and umbels. Heavy infestation leads to leaf curling, yellowing, and poor seed formation. Honeydew excretion favors sooty mold growth, further reducing photosynthesis.

8. Storage Pests of Spices

Even after harvest, dried spices remain vulnerable to storage pests. These insects thrive under warm and humid conditions and can infest packaging, warehouses, and retail stocks.

- Cigarette Beetle (*Lasioderma serricorne*)
- Drugstore Beetle (*Stegobium paniceum*)
- Saw-toothed Grain Beetle (*Oryzaephilus surinamensis*)

Damage: These beetles bore into dried spices such as chilli, turmeric, coriander, and cumin. Infestation results in powdery residues, contamination, off-flavors, and complete loss of aroma. Export consignments are often rejected due to storage insect contamination, making them highly significant economically.

Conclusion

Spices and condiments, though cultivated on relatively small acreage compared to food crops, contribute enormously to global trade and cultural heritage. Their high economic value makes them especially vulnerable to pest-induced losses. Field pests like borers, thrips, and aphids cause direct yield reduction, while storage pests destroy quality and export standards. To safeguard the spice industry, Integrated Pest Management (IPM) practices—such as use of resistant varieties, crop sanitation, biological control agents, pheromone traps, need-based insecticide applications, and proper post-harvest storage methods—are essential. Sustainable management of insect pests will not only increase productivity but also ensure that India and other spice-producing countries maintain their competitive edge in global markets.

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