



## Integrated Pest Management of Pod borer, *Helicoverpa armigera* in Gram

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### Abstract

The article on integrated pest management of gram pod borer in gram provides a comprehensive overview of the pest *Helicoverpa armigera*, a significant threat to chickpea crops in India. The pest's life cycle, damage caused, and management strategies are detailed. The gram pod borer inflicts damage by feeding on leaves, and flowers, and developing seeds in pods, leading to substantial yield losses. Integrated pest management strategies include cultural practices like deep ploughing, neem cake application, seed treatment, crop rotation, and intercropping. Additionally, the article emphasizes the importance of early sowings, collection of infested material, and the use of tolerant varieties to combat this pest effectively. By adopting these strategies, farmers can mitigate the impact of the gram pod borer and safeguard their chickpea crops.

**Keywords:** IPM, Pod borer, major pest, pulses

### Introduction

The "king of pulses," chickpea (*Cicer arietinum* L.), also referred to as Bengal gram, gram, or chana, is a significant crop of *Rabi* pulses in India and is mostly consumed as a source of protein. It is utilised for both human consumption and animal feed. Fresh green leaves are utilised as vegetables, while chickpea straw makes perfect cattle fodder. India produced 13.75 million tonnes of chickpeas in 2021–2022 (fourth estimate), with productivity of 12.6 q./ha, on 10.91 million ha of land (DES 2023, MOAF&W, GoI). Just chickpeas account for almost half of the production of pulses in India. Major states in India that produce chickpeas include Maharashtra (which contributes 25.97% of the country's production), Madhya Pradesh (18.59%), Rajasthan (20.65%), Gujarat (10.10%), and Uttar Pradesh (5.64%).

The food products are immature green grain (desi type), mature grain (desi/Kabuli type), flour of mature grain (besan, desi type), roasted grain (desi type), flour of roasted grain (shattu, desi type), split grain or pulse (dahl, desi type), flakes (desi type), baked goods (made from flour, desi type), sweets and savoury baked goods (made from flour, desi type), and various tertiary processed goods (cuisines). The market's growing trend of plant-based protein products (protein isolates, etc.) has increased the significance of chickpeas to the processing industry.

At a compound annual growth rate (CAGR) of 7.0%, the global market for chickpeas increased from \$13.93 billion in 2022 to \$14.9 billion in 2023 dollars. At a CAGR of 6.5%, the market for chickpeas is projected to reach \$19.19 billion in 2027. In 2021, India accounted for 5.87% of the world's chickpea exports (Rank 5, export volume of 94.08

MKG) and 12.51% of the world's imports (Rank 2, import volume of 240.97 MKG). India's percentage of the world's chickpea production in 2020 was 73.46% [Tridge, 2023].

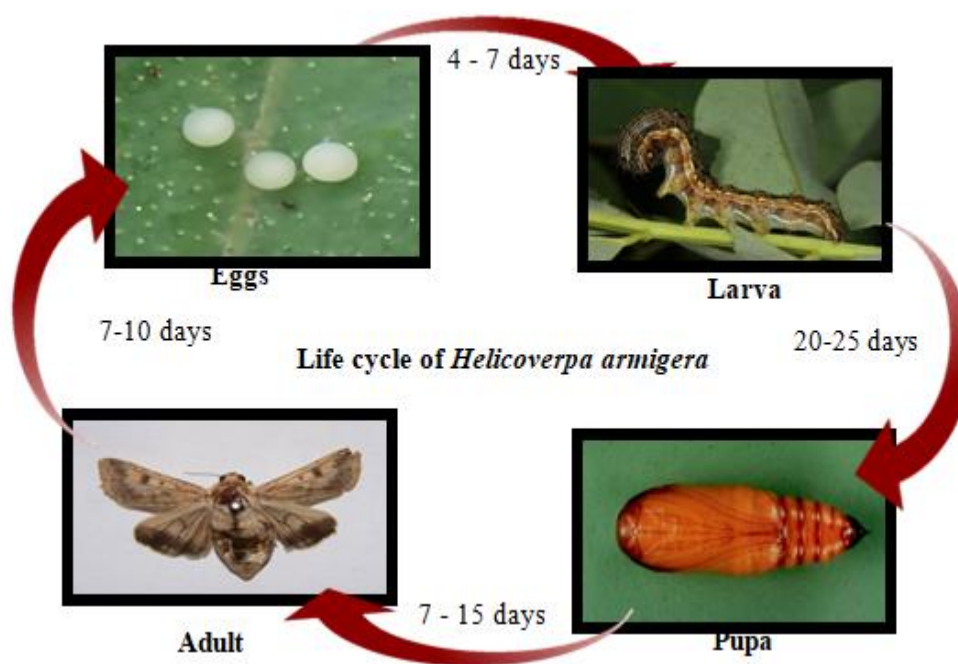
The gramme pod borer, *Helicoverpa armigera*, is the main insect pest of chickpeas. It is a polyphagous, multivoltine, and cosmopolitan pest that is known to feed on 182 species of plants belonging to 47 families in India. 57 species of insect pests and other arthropods are known to infest Bengal gram. In addition to feeding on approximately 250 crop types, *Helicoverpa armigera* has a broad host range. Beginning with the seedling stage of infestation, the gram pod borer eventually consumes the developing seeds in the pods as well as the flowers until the crop reaches maturity. Under typical weather circumstances, the yield loss range for chickpeas has been predicted to be between 10 and 60 percent. 50 to 100 percent during the crop season on cloudy days, which is favourable weather conditions. This generally accounts for 90 to 95 percent of the entire damage caused by insect pests.



Image source: - ICAR – Indian institute of Pulse Research/home/chickpea

### The gram pod borer's life cycle

The life cycle of the gramme pod borer consists of four stages: egg, larva, pupa, and adult. Finish his life cycle on the gram in about 35–70 days. A year could have up to eight generations.





## Identifications of gram pod borer

Approximately 500–750 eggs can be laid on sensitive plant sections by a single female. The eggs take a week to hatch. The freshly emerged larva has a pale green hue. When the development of pods occurs, the young larva feeds on the developing pods after starting to feed on the delicate parts of the leaves and shoots. In three weeks, after emerging from their pods, the larvae are well-fed. The mature larvae emerge from the pod and pupate in the soil for two weeks, extending their stay during the winter. The moth is robust, with pale forewings and pale hindwings with a dark apical border, and dark yellow, olive-grey, or brown wings that are crossed by a dark band near the outer edge and a dark spot near the coastal boundary.

## Nature of damage

Although the insect is active all year round, harm to gramme is done between November and March. Larvae cause the damage; they devour seedlings in their early stages while feeding on the leaves. It makes a hole in the pod and inserts its head inside, feeding on developing grain during the pod formation process. A single caterpillar is thought to destroy 30–40 gramme pods over its lifetime. Cannibalism is the practice of adult caterpillars feeding on their own tiny larvae based on observations. In cases of severe infection, twenty to fifty per cent damage may result. In cases of severe infection, twenty to fifty per cent damage may result. Following the gramme crop's harvest in March and April, it moves to the tomato and feeds on maturing fruit, which encourages the fruit to rot.



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<https://agrosiaa.com/krishidaily/blog/crop-management/the-complete-guide-of-gram-pod-borer-management-to-improve-the-yield-and-quality-of-chickpea-crop>

[https://pestoscope.com/wp-content/uploads/2020/05/Chickpea\\_Pod-borer\\_1.jpg](https://pestoscope.com/wp-content/uploads/2020/05/Chickpea_Pod-borer_1.jpg)

## Integrated strategy for gram pod borer

### Cultural Practice

- Ploughing through the deep summer and destroying stubble.
- Use of groundnut cake @10q/ha and neem cake @2q/ha.
- Using tolerant cultivars.
- Trichoderma seed treatment (5–10 g/kg), imidacloprid (3 g/kg), or thiamethoxam (4 g/kg).
- Rotate your crop to include less favoured crops such as jowar, gingelly, black gram, horse gram, and dry rice (in red gram).
- Gathering and rerouting the contaminated material from the field.
- Early sowings in endemic regions for pod flies.
- Raising intercrops/ Guard crop: In Bengal gram, mustard, and coriander as intercrops. In *Kharif* red gram like green gram, black gram, cowpea @ 1:7 rows and jowar in 2 rows in rabi red gram to encourage and conserve natural enemies viz., *Camponotus chloridae*, *Carcelia illote*, *Apanteles sauros*, *Microbracon brevicornis*.

### Mechanical Control

- T-shaped sticks (60–70/ha) and sex pheromone traps (10/ha) are used to monitor the *Helicoverpa armigera* population
- Managing weeds and manually removing plants infested by insects.
- Collect nymphs and adults and destroy them by dipping them into kerosinized water and foliar spray with carbaryl @3 g/l or monocrotophos 1.5 ml /l or dimethoate 2 ml/l or methyl parathion 2 ml/l or phosphamidon 2 ml/l in case of bugs.

### Plant Products

- Apply 5% neem seed kernel extract.
- Using commercial formulations based on neem, such as those that contain 0.15% azadirachtin at 2.5 lit/ha.

### Bio-agents

- HaNPV 250LE/ha is applied. Add 1 ml of liquid soap, 1 g of jaggery, and 1 ml of teepol into 1 litre of water.
- Use 2g of *Bacillus thuringiensis* per litre of water.

### Chemical Control

- Avoid indiscriminate use of mixtures, insecticides and synthetic pyrethroids.
- Take a community-based strategy.
- Foliar sprays should start when 50% of the plants have flowered.
- Foliar spraying starting at the initiation of the flower bud with a mixture of dichlorvos (1 ml/l) in weakly spaced intervals in the case of Maruca, or 2.5 ml/l of chlorpyrifos or quinalphos, or 0.75 ml/l of novaluron, spinosad, or 0.75 ml/l of lambda-cyhalothrin.
- Weekly foliar treatments against pod fly and pod wasp at the pod development stage, using 1.5 ml/l of monocrotophos or 2 ml/l of dimethoate combined with 1 ml/l of dichlorvos.
- Applying systemic insecticides topically, such as 1.5g/l of Acephate or 2 ml/l of dimethoate, to prevent leaf miners and stem flies. In severe incidence, indoxacarb 1 ml/l or spinosad 0.3 ml/l.
- For severe occurrence, use 0.3 ml/l of spinosad or 1 ml/l of indoxacarb.

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