

The Linseed Bud Fly: A Growing Threat and How to Combat It

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ABSTRACT

Linseed (*Linum usitatissimum*) faces significant yield losses due to the linseed bud fly (*Dasyneura lini*), which damages buds, flowers, and pods, leading to poor seed quality and reduced productivity. Conventional pesticide use raises environmental and health concerns. Eco-friendly Integrated Pest Management (IPM) strategies, including field sanitation, crop rotation, timely sowing, and resistant varieties, offer sustainable alternatives. Additional methods like light traps, neem-based treatments, and natural predators help manage pest populations effectively. These practices ensure sustainable linseed production while minimizing environmental impact.

INTRODUCTION

Linseed, also called flaxseed (*Linum usitatissimum*), is one of the oldest cultivated crops, known for its diverse applications (Singh *et al.*, 2011). Its stems provide strong fibers used in making textiles like linen and paper (Gill, 1987), while its seeds produce oil high in linoleic acid (over 66%), with an oil content ranging between 33-45% (Rizwan *et al.*, 2019). By-products from

its tissues are also utilized for wax and paper production. In India, linseed is grown on 1.94 lakh hectares, yielding 1.67 lakh tonnes (Indiastat, 2022). Key linseed-producing states include Uttar Pradesh, Madhya Pradesh, and Maharashtra, where it is predominantly grown during the *rabi* season as "Utera" (Agashe *et al.*, 2018).

The crop faces significant damage from pests like the linseed bud fly (*Dasyneura lini*), which causes yield losses ranging from 50-80%, especially in central and northern India (Khalkho *et al.*, 2018). Excessive pesticide usage raises environmental and health challenges, including residue contamination, harm to beneficial insects, secondary pest issues, and ecological disruption (Daharia, 2011). A sustainable alternative is integrated pest management, which emphasizes the development of pest-resistant varieties, with some linseed cultivars showing moderate to high resistance to bud fly infestations (Singh *et al.*, 1990).

Incidence of Pest

The linseed bud fly is a major pest of linseed crops, causing extensive damage not only to floral buds but also to young plant leaves. Damage to flower buds varies between 13.6% and 75.8% (Deshmukh *et al.*, 1992). Infestation typically begins in the second week of January and continues until late March, peaking at 10.10% during the third week of March (Rizwan *et al.*, 2019). Understanding the patterns and population dynamics of pest infestations is essential for devising effective pest management strategies.

Host Plant and Distribution

The linseed bud fly (*Dasyneura lini*) is a highly destructive pest, targeting the vegetative parts of linseed, including buds, flowers, and pods. It poses a serious threat in states like Uttar Pradesh, Bihar, Madhya Pradesh, Andhra Pradesh, Delhi, and Punjab.

Nature of Damage

The flaxseed bud fly significantly impacts linseed production. Females lay eggs on the sepals of young buds, and larvae feed inside the ovaries, causing distorted, hollow buds that reduce yield (Daharia, 2011). Infestation persists in late-maturing varieties as long as

buds are present. The larvae drop to the soil, form silken cocoons, and pupate. Adult flies are small and orange, but damage arises from larval feeding, leading to gall formation, stunted growth, pod deformation, and poor seed quality. Severe infestations prevent pod formation, resulting in substantial yield losses.



Figure 1 Damaged buds

Identification of Pest

The eggs of the linseed bud fly are small, curved, and smooth, appearing almost transparent initially but gradually turning a dirty white as they mature. Newly hatched maggots are nearly transparent, with a yellowish area visible in the abdomen. The maggots undergo four distinct developmental stages (instars). When fully grown, the larva is pink in colour, measuring about 2 mm in length and 0.5 mm in width. The adult linseed bud fly is tiny, about 2-3 mm long, with a slender body that appears yellow or orange. Its transparent wings and small size distinguish it. Infestation by the larva is identified by the characteristic gall formations on the linseed plant, which serve as a primary indicator of pest activity in cultivated linseed fields.

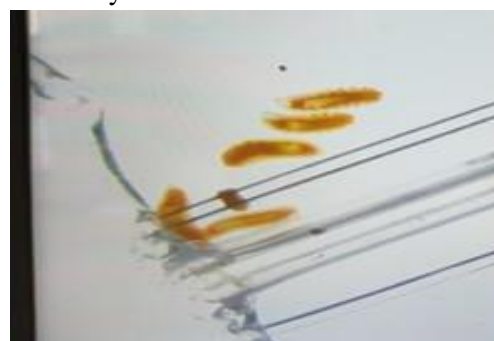


Figure 2 Maggots of bud fly



Figure 3 Adult of bud fly

Sustainable approaches to combat linseed bud fly:

To effectively manage linseed bud fly infestations using environmentally safe methods, the following strategies can be adopted:

- ✓ **Field Sanitation:** Remove and destroy crop residues and debris to eliminate potential hiding places for pests.
- ✓ **Soil Solarization:** Conduct summer ploughing to expose and kill pupae, reducing the chances of infestation in the subsequent crop.
- ✓ **Crop Rotation:** Avoid growing linseed continuously in the same field. Rotate crops every 2-3 years to break the pest's lifecycle and prevent its survival into the next season.
- ✓ **Companion Cropping:** Cultivate companion crops like mustard, chickpeas, lentils, and safflower to reduce the prevalence of linseed bud fly, particularly in rainfed areas.
- ✓ **Timely Sowing:** Sow linseed crops early, around the first fortnight of October, to minimize bud fly infestation.
- ✓ **Resistant Varieties:** Opt for resistant or less susceptible linseed varieties, such as Neela, JLS (J)-1, and LCK 1933, which show lower bud fly infestation levels (Kanwar *et al.*, 2022).
- ✓ **Light Traps:** Use light traps to capture and reduce adult flies, preventing egg-laying and subsequent generations.
- ✓ **Attractants:** Deploy attractants, such as a mixture of 1 kg jaggery or molasses in 75 liters of water, at various locations in the field.
- ✓ **Predatory Birds:** Install 25-30 T-shaped wooden or bamboo perches per hectare to attract insectivorous birds like Black Drongo (*Dicrurus adsimilis*) and Myna (*Acridotheres tritis*), which feed on pests and help control their population.
- ✓ **Neem-Based Products:** Apply neem-based formulations containing Azadirachtin (300 ppm) or Nimbecidine at 0.25% concentration twice, which can reduce bud infestation by up to 63%.
- ✓ **Biological Control:** Conserve and utilize larval parasitoids like *Eurytoma sp.*, *Torymus sp.*, *Tetrastichus sp.*, *Systasis dasyneurae Mani*, and *Elasmus sp.* to control bud fly populations effectively.
- ✓ **Natural Predators:** Encourage predators such as coccinellid beetles (*Coccinella septempunctata* and *Menochilus sexmaculatus*) that prey on mature maggots outside the buds, offering natural pest control.

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