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Mustard Aphid, *Lip aphis erysimi* Kalt: Life cycle and Integrated Management for Sustainable Mustard Production

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Oilseed crops hold a significant place in Indian agriculture. Among the insect pests attacking mustard, the mustard aphid (*Lipaphis erysimi* Kalt.) is considered one of the most serious threats. It not only causes heavy seed yield losses up to 73.3 per cent but also negatively affects the oil content up to 66.9 percent (Gautam *et al.*, 2019). The excessive use of conventional pesticides has led to issues such as pest resistance and environmental harm, creating a need for more sustainable pest management approaches. This article studies Integrated Pest Management (IPM), a holistic approach to pest control, which plays a vital role in effectively controlling pests in mustard cultivation through cultural practices such as early sowing, clean cultivation and deep ploughing, sticky traps and manual removal, complement biological approaches that utilize natural enemies and bio pesticides as eco-friendly alternatives. Neem-based botanical insecticides are known for their effectiveness and low environmental impact. Chemical pesticides are applied judiciously, with insecticide use recommended by the Economic Threshold Level to protect pollinators and maintain ecological balance.

Keywords: Insect pests, Chemical pesticides, IPM, Mustard

Introduction

Mustard belongs to the family Cruciferae and genus Brassicaceae. Mustard cultivation flourishes primarily during the *Rabi season*, thriving across temperate and selected tropical regions worldwide. India is the largest producer and consumer of mustard, the second-most important edible oil crop after groundnuts (Sharma, 2017; Rijal *et al.*, 2026). Rajasthan ranks first in area and production of Indian mustard with 2.50 million ha area and 3.71 million tonnes production. In Punjab, mustard is grown on 32 thousand hectares with a production of 41.8 thousand tonne and a productivity of 1306 kg per hectare (Sharma *et al.*, 2025). Insect pests are a significant challenge for growing oilseed crops around the world. Among them, aphids cause severe losses in rapeseed and mustard, particularly in regions where mustard is extensively cultivated. Their rapid population growth, driven by reproductive modes such as parthenogenesis and vivipary, enables swift spread across fields. Crop damage results from sap extraction, transmission of plant viruses, and secretion of harmful substance that weaken plant vigour and yield. Among these, the *L. erysimi* is the major pest causing up to 4-81% losses (Mwanika *et al.*, 2024).

Distribution and status

Mustard aphid is a noted pest that infest mustard and related crops. *L. erysimi* attack mustard growing stage and areas. They are common in the northern parts of India. The activity of aphids in a mustard crop usually starts form November to March, with the peak period during

mid-February to mid-March (Sreedhar *et al.*, 2019). The maximum population was noted last week of December. Damaging in crop start growth phase, such as seedlings, vegetative stage, and the seed formation stage.

Host Range

The mustard aphid (*Lipaphis erysimi*) primarily ingest plants belonging to the Brassicaceae family. Its host range include both cultivated and wild species within this botanical group. The most common host are mustard such as Indian mustard (*Brassica juncea*) and rapeseed, vegetable like broccoli, cauliflower and cabbage.

Biology

Egg: *Lipaphis erysimi* egg are minute, oval, and initially yellow, turning shiny black as they mature. They are typically found in small groups or singly along the veins of leaves, stem and inflorescences of the host plant. While they overwinter as egg, they mostly reproduce parthenogenetically during the cropping season.

Nymph: Reproducing parthenogenetically, they can produce 26-133 nymphs in 7-10 days, and 45 generations annually.

Adult: Aphids have a small, soft body insects that are usually about 1-4 mm long. Their bodies are typically pear-shaped or oval, and depending on the species, they may appear in shades of green, yellow, black or red. The antennae are dark, and the legs are pale with dark joints and cornicles (wax- secreting tubes, 5-6 abdominal segment) with pale colour with dark tips. The body is faintly dusty with white powder. These are female aphids in wingless, olive grey or yellowish green colour, and white a waxy bloom covers the body.

Feeding Damage

In high-moisture areas, where relative humidity is high, aphid damage is also serious, whereas it is less in low-moisture areas. Both adult and nymph extract sap from leaves, stems, and pods, resulting in leaf curling, wilting and impaired pod formation. Plants infested with aphids often appear blighted due to sooty mould growth on the honeydew excreted by the aphids.

Management

a) Cultural Practices:

1. **Early sowing:** Sowing mustard before October 20th allow the crop to escape the critical peak infestation period aphid. Choose the early maturity variety.
2. **Crop Rotation:** Crop rotation mustard with non-host can help reduce aphid populations by disrupting their lifecycle.
3. **Resistance varieties:** Planting aphid-resistant mustard varieties, when available can help reduce the severity of infestations. JM-1 & RK-9501
4. **Spacing:** Maintaining proper plant spacing and routinely infested parts help enhance airflow, which in turn lowers the risk of aphid outbreaks.

b) Biological Control:

1. **Conserve the following natural enemies:** *Coccinella Septempunctata*, *Menochilus seamaculata*, *Hippodamia variegata* and *Cheilomones vicina* most efficient predators of the mustard aphid. Adult beetle may feed on average of 10-15 adults/day and release 5000 beetles per hectare at the early stage of infestation.
2. Several species of syrphid fly i.e., *Sphaerophoria* spp., *Eristalis* spp., *Metasrhythis* spp., *Xanthogramma* spp., *Stryphus* spp. release 2500 hoverfly larvae per hectare.
3. **Parasitoid:** The beaoned parasitoid *Diaeretiella rapae* release 1,00,000 parasitized aphids per hectare.
4. The lacewing, *Chrysoperla carnea* predators on the mustard aphid colony.
5. **Predatory bird:** *Motacilla cospica* is actively feeding over aphids in Feb- March.
6. **Fungi:** A number of entomogenous fungi, *Cephalosporium* spp., *Entomophthora* spp. and *Verticillium lecanii* apply at a concentrations of 1×10^8 spores/ml as a foliar spray.

c) Mechanical control:

1. **Yellow sticky trap:** The use of yellow sticky traps (10-15 hectare) is also highly effective, as they attract and capture aphids, thereby reducing their population and limiting further spread.
2. **Hand removal:** Infested plant parts (shoots, leaves and inflorescences) hand removal.
3. **Water spray:** Spraying a strong stream of water dislodges aphids from plants, especially effective in small fields or kitchen garden.

d) Chemical control:

1. **Selected insecticides:** Apply insecticides formulated to target aphids while minimizing harm to beneficial insects. Neem oil, insecticidal soaps, and plant derived products.
2. Apply insecticides only when aphid populations reach a threshold level, avoiding unnecessary treatments that can harm the environment.

Conclusion

Sustainable pest management in rapeseed-mustard cultivation relies on a well-structure integrated pest management (IPM) strategy. This approach combines cultural, mechanical, biological and chemical practices to minimize crop damage while preserving ecological balance. Regular field surveillance, strict adherence to economic threshold (ETL), and the application of bio-agents with botanical insecticides form the backbone of effective and environmentally pest control.

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