

Integrated Pest Management for Mustard Aphid, *Lipaphis erysimi* (Kaltenbach)

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Abstract

Mustard aphid is the most serious and destructive insect pest of all and it is a major limiting factor for mustard farming. IPM techniques that combine cultural, biological and chemical control measures are advised for effective pest management. Crop rotation, early planting and trap cropping are all cultural practises that can aid in insect prevention and control. Biological control, which employs natural enemies like as parasitoids and predators, is essential for pest population control. Selective pesticide applications are considered when pest numbers surpass economic criteria. Regular pest population monitoring and early intervention based on defined thresholds are crucial for efficient pest control. Continuous research and innovation are also essential to establish and improve sustainable management practises. Farmers can use these comprehensive and integrated pest control strategies to reduce the impact of insect pests, safeguard mustard crops from injury and ensure long-term mustard production.

Keywords: Biological control, Integrated approaches, Mustard aphid, Pest management

Introduction

Mustard (*Brassica* spp.) is a widely produced oilseed crop renowned for its economic value and adaptability. It belongs to the Brassicaceae family, which includes other cruciferous vegetables including cabbage, broccoli and cauliflower. Since ancient times, mustard farming has been performed, and it still plays a crucial part in the production of food and agriculture today. *Brassica* plants are essential in global agriculture since they are used to make oilseeds, vegetables, fodder, biodiesel and sauces (Pal *et al.*, 2020). *Brassica* crops are economically valuable due to their nutritional value, medicinal capabilities, bio-industrial value, crop rotation and bio control properties. *Brassica* is high in vitamin C, as well as dietary fibre, protein, iron, calcium and vitamin A, as well as anti-oxidants and anti-cancer properties. Rapeseed mustard has enough necessary fatty acids and linoleic acid. It contains the lowest level of saturated fatty acids when

compared to other edible oils (Dotasara *et al.*, 2018). Oil cake contains 5.2%, 1.8% P₂O₅, 1.2% K₂O, 37-44% protein and 5-9% ash and has an iodine value ranging from 74 to 98.

Insect pests wreak havoc on mustard production, lowering output and quality. A variety of insect pests attack mustard crops at various stages of development, causing damage to various plant portions. The mustard aphid (*Lipaphis erysimi*) is a common pest that feeds on the sap of the mustard plant, causes stunted development, wilting and the transmission of viral diseases. The most significant and damaging insect pest in mustard farming is the mustard aphid (*Lipaphis erysimi*) (Aphididae: Hemiptera). The mustard aphid, which can result in up to 96% loss of production and a six percent decrease in oil content, is a significant limiting factor. Aphids significantly reduce production by removing the cell sap from stems, twigs, buds, flowers, and growing pods. They are active from the end of January through the end of March. They target crops from the blossoming stage till maturity.

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They prefer overcast days. *Lipaphis erysimi*, both nymphs and adults, were phloem feeders, causing yellowing, curling and subsequent drying of the leaves, resulting in weak pods with few seeds. Aphids envelop the entire plant in severe infestations, resulting in restricted growth. Additionally, it releases honeydew, which promotes the development of black sooty mould.

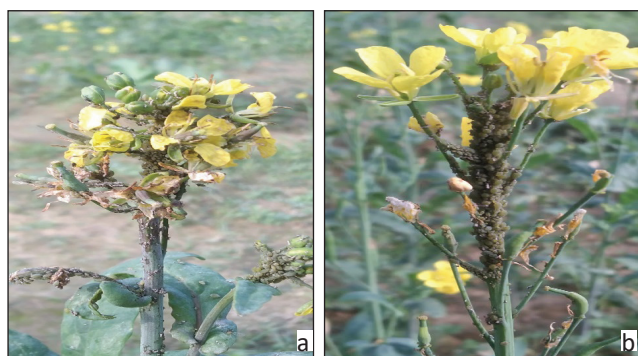
Identification of Mustard Aphid

It is a common insect pest that feeds on mustard crops. These little, pear-shaped insects are light green to yellowish-green in colour and feed on mustard plants by sucking sap from the leaves. Mustard aphids reproduce swiftly, leading to population explosions in suitable conditions. Infestations of these pests can result in leaf deformation, slower development and diminished crop vitality. *Lipaphis erysimi*, the Mustard aphid, has a varied life cycle that is influenced by environmental conditions such as temperature. On average, the life cycle from egg to adult takes 10-15 days. Within a few days, the eggs hatch into nymphs and the nymphs go through several moults before reaching adulthood. Each nymphal stage might last anywhere from 1-3 days. After reaching adulthood, aphids can live for several weeks, during which time they reproduce and repeat the cycle. The lifespan of an adult aphid can range from 10 to 30 days, depending on factors such as temperature, food availability and the presence of natural predators.

Damaging Stage: Nymph and Adults

Nature of Damage

Mustard aphid infestations in mustard crops can cause yellowing of leaves, curling and deformation of leaves, slower growth, withering and yellowing of shoots and the production of honeydew and sooty mould (Figure 1). Timely identification and management are crucial for limiting the damage caused by these pests.



a) Plant damage at flowering stage b) Aphid population on 10 cm apical twig

Figure 1: Severe infestation of mustard aphid at flowering stage

Seasonal Occurrence of Mustard Aphid (*Lipaphis erysimi*)

Mustard Aphid (*Lipaphis erysimi*) is more abundant in locations where mustard crops are grown during the cooler months, usually from November to February. These months correspond with the winter season in many countries. The cooler temperatures during this time period help aphid populations develop and reproduce. It is important to remember, however, that aphid populations can be

influenced by specific climatic changes and microclimates and infestations can develop outside of the conventional winter season.

Integrated Management of *Lipaphis erysimi*

Cultural Practises

Cultural practises are crucial in the management of Mustard aphid infestations. Plant vigour is boosted and aphid populations are reduced through early sowing, adequate spacing and field cleanliness practises like crop waste management. These cultural practises make aphids uncomfortable, limiting their damage to mustard crops.

Biological Management

Mustard Aphid (*Lipaphis erysimi*) biological management entails using natural enemies to control aphid numbers. Ladybirds (Coccinellidae), lacewings (Chrysopidae) and parasitoid wasps (Aphidiidae) are three of the most common biological control insects. These natural enemies eat aphids and help to control their number. Planting companion plants that attract beneficial insects, for example, can be utilised to encourage their presence.

Chemical Management

Pyrethroid insecticides include lambda-cyhalothrin (2.5% EC formulation) and deltamethrin (1% EC formulation). These insecticides are applied in the specified amounts, which are typically 20-30 ml per 10 litres of water.

Conclusion

To summarise, mustard aphids cause severe damage to mustard crops from flowering to crop maturity. Effective pest management is essential for minimising crop damage and guaranteeing efficient mustard production. The most durable and successful IPM practises include cultural, biological and chemical control techniques. Crop rotation, early planting and trap cropping are all cultural practises that can aid in pest control. When pest populations exceed economic thresholds, biological treatment with natural enemies such as parasitoids and predators can be used and selective pesticide sprays can be used as a last resort when pest populations exceed economic thresholds. Regular pest population monitoring, rapid response based on specified thresholds and continuous research and innovation are necessary for successful pest management in mustard crops. By employing these comprehensive and sustainable management strategies, farmers may limit the effect of insect pests while increasing the long-term production and profitability of mustard agriculture.

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