

Tackling the musk melon fruit fly: A threat to favourite summer fruit

The melon fruit fly, *Zeugodacus cucurbitae*, is a major pest of muskmelon and other cucurbit crops, causing severe yield losses ranging from 30% to 100%. Infestation begins with egg laying in tender plant parts, followed by larval feeding that leads to fruit rotting and reduced market value. Its rapid life cycle, wide host range, and increasing resistance to chemical insecticides complicate management. Sustainable control requires an integrated pest management (IPM) approach combining cultural, mechanical, and biotechnical strategies. Key practices include field sanitation, deep ploughing, fruit bagging, and timely crop management. Techniques such as Male Annihilation Technique (MAT) using Arka Cucurlure and Bait Application Technique (BAT), along with botanical insecticides, offer eco-friendly and effective solutions for long-term suppression.

Keywords: Arka Cucurlure, Bait Application Technique, Integrated Pest Management, Melon fruit fly, Muskmelon, *Zeugodacus cucurbitae*

THE melon fly, *Zeugodacus cucurbitae* (Coquillett) (Tephritidae: Diptera), is a serious pest of muskmelon and other cucurbitaceous crops, causing significant economic losses to farmers. Female flies deposit their eggs in the delicate vines and fruit rinds. The larvae that hatch from these eggs feed voraciously, resulting in the rotting of fruits and vines.

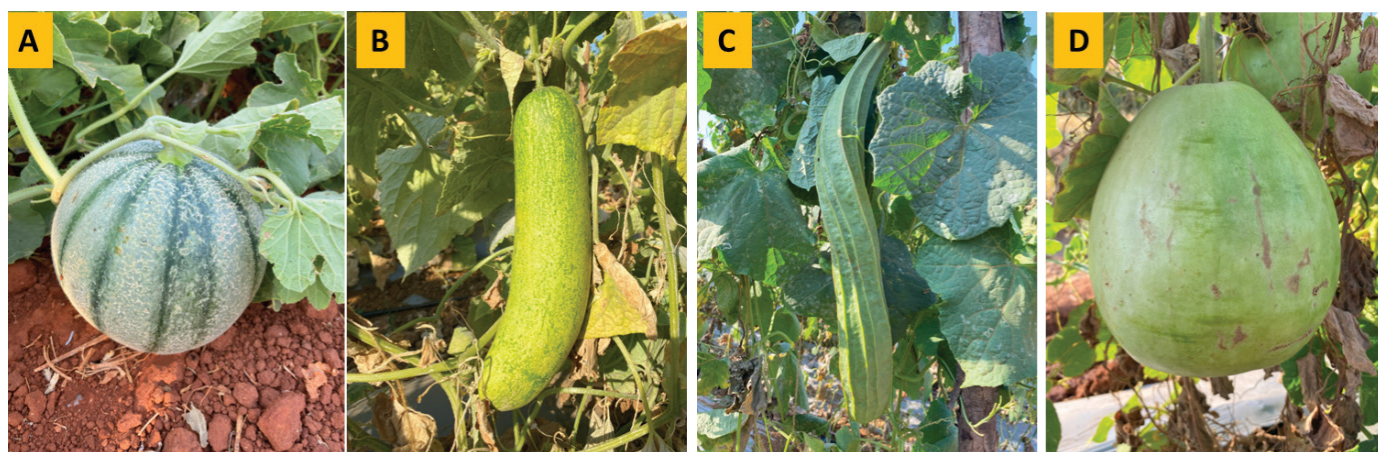
The impact of melon fly infestation extends beyond crop losses, as it often necessitates the use of chemical insecticides, thereby increasing production costs and posing risks to human health and the environment. Due to its wide host range, rapid reproductive cycle, and ability to develop resistance to insecticides, the melon fly remains a persistent challenge for farmers. Effective management strategies, particularly integrated pest management (IPM)

approaches, are essential to minimise crop losses and mitigate the impact of this pest.

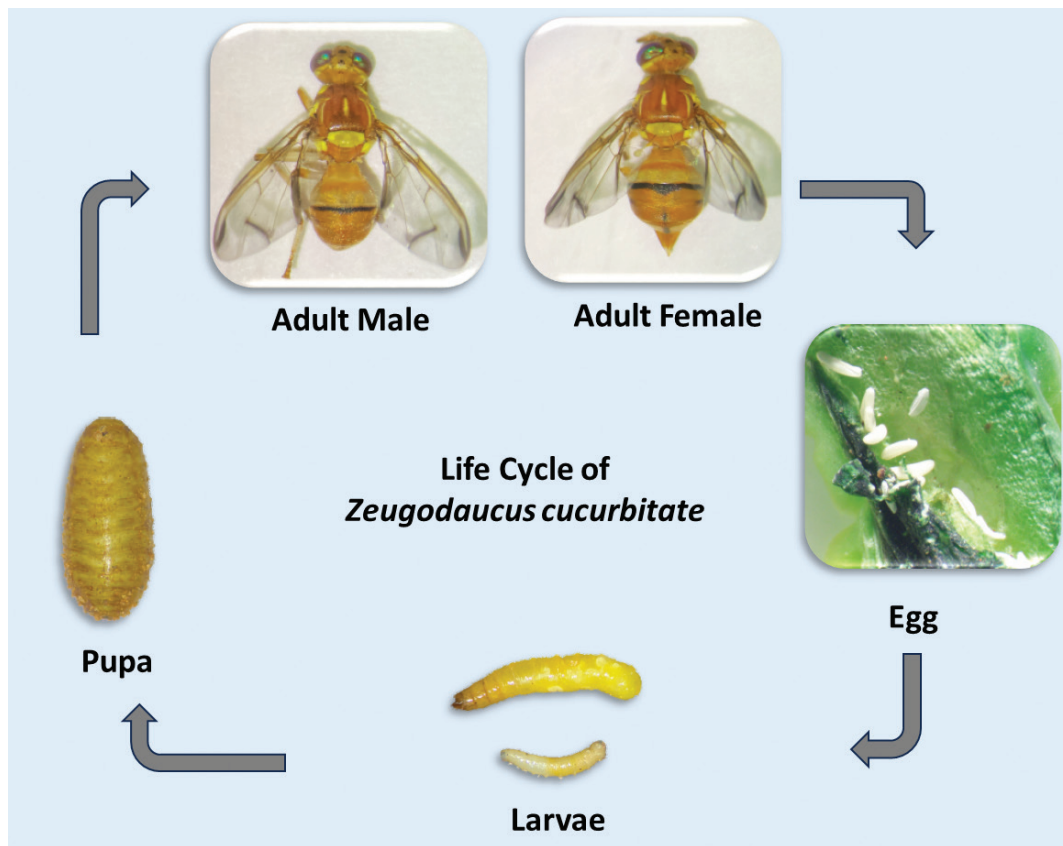
Host plants: Melon flies infest at least 125 host plants. Economically important hosts include muskmelon, watermelon, cucumber, pumpkin, squashes, and gourds (ridge gourd, bitter gourd, bottle gourd), among others.

Biology of melon fruit fly

Life cycle: The melon fly undergoes four distinct stages in its life cycle: egg, larva, pupa, and adult. The development from egg to adult typically takes 15–30 days. A single female can lay up to 1,000 eggs. Eggs are usually laid in young fruits at a depth of 2–4 mm, although they may also be deposited in the succulent stems of host plants. Using its sharp ovipositor, the female creates



Economically important host plants of melon fruit fly.
A) Musk melon, B) Cucumber, C) Ridge gourd, D) Bottle gourd



Life cycle of melon fruit fly (*Z. cucurbitae*)

cavities in which the eggs are placed. Pupation generally occurs in the soil. The melon fly completes about 8–10 generations per year.

Egg

The egg is elliptical, about 2 mm long, and creamy white in colour. It is nearly flat on the ventral surface and more convex dorsally. Eggs often show a slight longitudinal curvature. The incubation period ranges from 4.0 to 4.2 days.

Larva

The larva is elongated and cylindrical, with a ventrally curved anterior end. Fully grown larvae (last instar) measure 7.5–11.8 mm in length. The larval stage lasts 3–21 days. Mature larvae create one or two exit holes in the fruit before dropping to the soil to pupate. They typically pupate at depths ranging from 0.5 to 15 cm in the soil.

males (15.0–28.5 days). The average adult lifespan ranges from 27.5 to 30.7 days.

Nature and extent of damage

The melon fly is one of the most destructive pests of muskmelon crops. It attacks the crop at various stages, with maggots feeding on the delicate vines and fruits. Females generally prefer to lay their eggs in soft, tender fruit tissues by piercing them with their ovipositor. The punctures exude a watery fluid that later dries into a brown, resinous deposit and forms slight depressions as the fluid seeps out, thereby reducing the market value of the fruits.

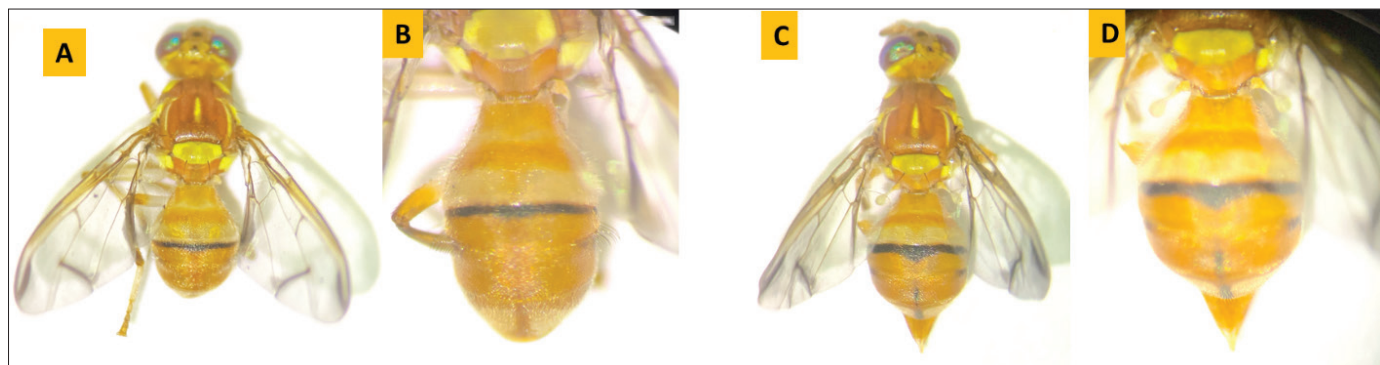
After hatching, the maggots bore into the pulp tissue and feed, creating galleries within the fruit. As a result, the fruits rot or become deformed. The extent of losses varies from 30 to 100%, depending on the cucurbit species and the season.

Pupa

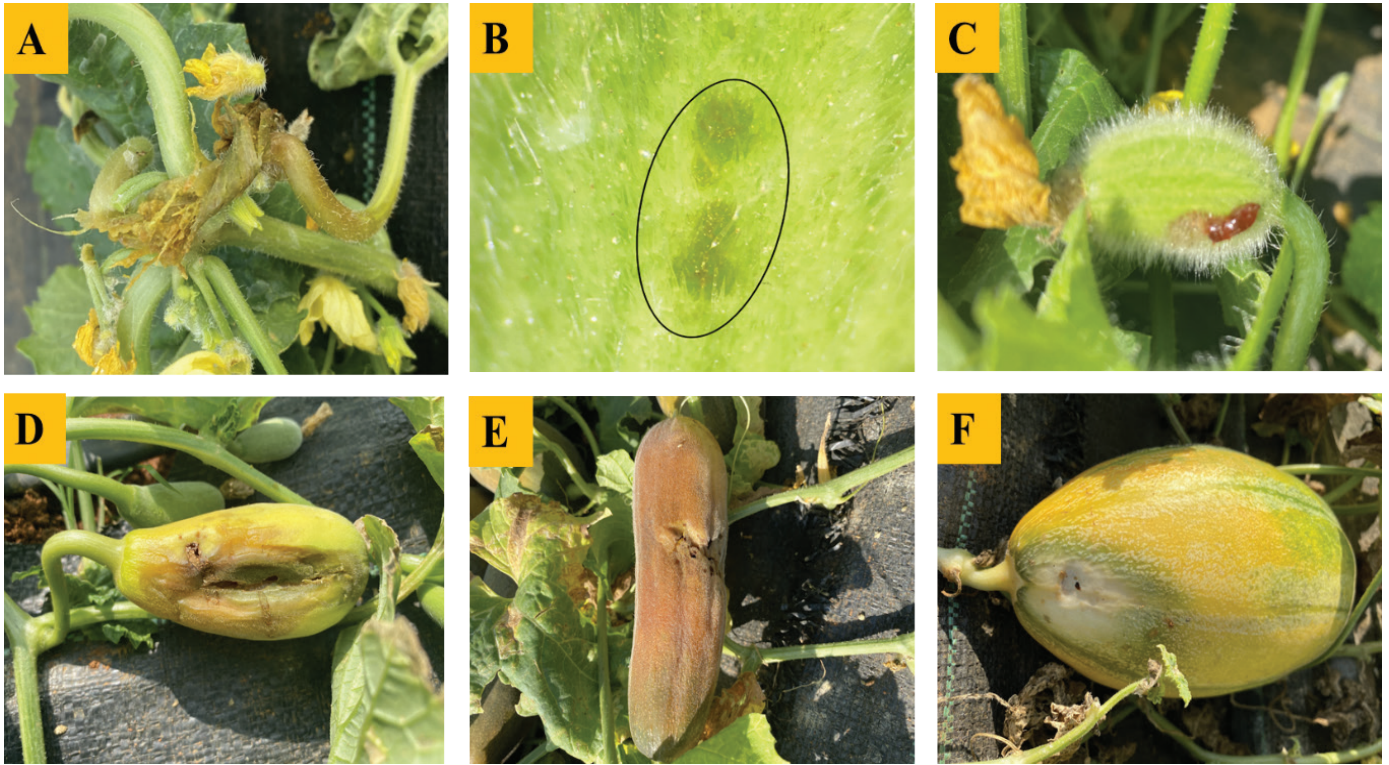
The puparium is about 5–6 mm long and varies in colour from dull red or brownish-yellow to dull white. The pupal period usually lasts 6–9 days during the rainy season and up to 15 days in winter.

Adult fly

Adult melon flies measure 6–8 mm in length. They are distinguished by their characteristic wing pattern, a reddish-yellow thorax with light yellow markings, and a yellowish head. Females are larger and possess a pointed ovipositor for egg-laying, whereas males are smaller with a more curved, blunt abdomen. Females generally live longer (21.7–32.7 days) than



A) Adult Male; B) Abdomen of adult male; C) Adult female; D) Abdomen of adult female with ovipositor



Nature of melon fruit fly damage. A) Stem damage; B) Oviposition punctures; C-F) Fruit damage.

Strategies for integrated management of melon fruit fly

- Adopting proper field sanitation practices can significantly reduce melon fly populations. Infested fruits should be collected, destroyed, and buried deep in the soil to prevent further multiplication.
- Deep ploughing after harvest helps expose and kill pupae present in the soil.
- Timely planting, proper irrigation, and balanced soil fertility enhance plant vigour and reduce susceptibility to melon fly infestation.
- Area-wide management through collective efforts by farmers is effective for long-term suppression of melon fly populations.
- The fruit initiation stage is the most critical period for melon fly attack. Therefore, management practices should be implemented before this stage in muskmelon. Bagging of fruits after fruit set helps prevent egg-laying by female flies.
- **Male Annihilation Technique (MAT):** Adult male flies can be monitored and controlled using cue-lure traps, which are highly effective in attracting males. A recently developed formulation, *Arka Cucurlure* (ICAR–Indian Institute of Horticultural Research, Bengaluru), combining plant volatiles with cue-lure, has shown higher efficacy (about 50% more attraction) compared to conventional cue-lure traps.
- **Bait Application Technique (BAT):** Spot application of bait—a liquid mixture of 100 g jaggery + 20 g yeast + deltamethrin @ 2 mL per litre of water—can be applied on leaves using a brush to attract and kill both male and female melon flies.
- Need-based spraying of azadirachtin 0.03% @ 3 mL/L can also be used as part of an integrated management approach.



Arka Cucurlure trap

SUMMARY

The melon fruit fly has emerged as one of the most destructive pests of muskmelon and other cucurbitaceous crops in India, posing a major challenge to growers, particularly during the summer season. Its infestation not only leads to substantial yield losses but also increases reliance on chemical insecticides, thereby affecting farm economics and environmental health.

To effectively manage this pest, an integrated pest management (IPM) approach incorporating cultural, mechanical, and eco-friendly biotechnical strategies is essential. Area-wide management, timely monitoring, and active community participation are critical for reducing

pest populations and ensuring sustainable muskmelon production. The adoption of innovations such as the *Arka Cucurlure* trap (MAT) and the BAT method can further enhance the effectiveness of IPM practices.

A coordinated and informed approach is therefore vital to safeguard this important summer crop and support the livelihoods of farmers.

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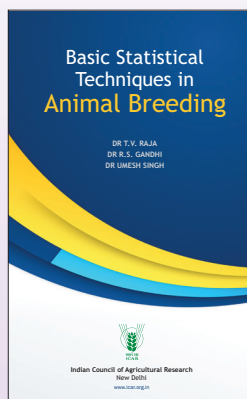
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