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Fruit Fly Species of India

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SUMMARY

Fruit fly species are distributed widely along a wide range of environmental conditions, ranging from temperate, tropical to sub-tropical. Fruit flies are prominent members of major economic pest complexes in both vegetable gardens and orchards. Many fruit fly species are native to India and the wide range of temperate and tropical conditions have enabled the growth of the pest population. This article discusses the major fruit fly species found on the Indian subcontinent along with its nature of damage and management options.

INTRODUCTION

Fruit flies are a group of polyphagous insect pests, all belonging to the family Tephritidae. There are a recorded number of 4352 species belonging to 483 genera across the globe with 200 species and 71 genera having been reported from India. A major pest of agricultural fruits, vegetables and ornamental plants, fruit flies are responsible for a huge amount of economic damage amounting to a loss of 30, 000 million rupees annually. Owing to their broad host range, high adaptability and high fecundity, fruit flies have been able to spread over a wide range of habitats across India. Despite the nature of infestation and severe damage caused by fruit flies, the management of fruit flies has hardly proved successful. The broad geographic distribution of fruit fly species has contributed to the inability to create and disseminate a proper and effective pest-control tactic. In the past, pest management strategies including but not limited to insecticides, lure traps, biological control and use of natural enemies have only provided a temporary solution often resulting in resurgence of pest populations. Hence, improvement, specialization and localization of pest management strategies is of the utmost importance. In order to make an effective pest management strategy, the thorough study and understanding of the various fruit fly species is important and should be prioritized.

Nature of Damage

The most destructive stage in the life cycle of fruit fly is the maggot. The females lay their eggs in the soft tissues of the fruit with the help of an ovipositor. This leaves a distinct puncture hole in the fruits which causes a watery fluid to ooze, out of it, eventually becoming a brown resinous deposit. Puncture holes known as "pseudo-punctures" also exist which do not contain any eggs. The presence of puncture holes in the fruits causes a drop in their market value. After hatching, the maggots give start to feed on the fruits by boring into the pulp tissues, creating feeding galleries eventually causing the fruit to rot and decompose. It also feeds on the flowers and stems. The continuous feeding and migration of maggots to healthier tissues makes the fruit more prone and vulnerable to various pathogen infestations.

Distribution of Major Fruit Fly Species in India

The major species of fruit fly present in India mainly belong to the five subfamilies, Phytalminae (Phytalmine fruit fly), Dacinae (Dacine fruit fly), Ceratitidinae (Ceratitidine fruit fly), Trypetinae (Trypetine fruit fly) and Tephritinae (Tephritine fruit fly). The subfamily Dacinae has the highest number of economically important pests. Out of the five sub families, the major fruit fly species found in India have been discussed in the following sections.

1. ***Bactrocera zonata* (Peach fruit fly):** A polyphagous pest belonging to the subfamily Dacinae (Figure 1), it is a major pest of about 50 economically important crops like peach, mango, papaya, apricot, guava and figs. It has also been reported from wild host plants of the families, *viz.* Euphorbiaceae, Lecythidaceae and Rhamnaceae. It is one of three most destructive species of fruit flies casing a damage of 25-100 % in peach, guava and figs in India. It has been reported from the states of Andhra Pradesh, Assam, Bihar, Delhi, Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Tamil Nadu, Uttaranchal, Uttar Pradesh and Maharashtra.

2. ***Bactrocera dorsalis* (Oriental fruit fly):** *B. dorsalis* (Figure 2) is distributed throughout India**,** it has been reported to cause 5-80% and 10-80% fruit loss in mango and guava respectively. Its host range includes about 117 species including guava, mango, citrus fruits and on weed *Solanum indicum*. It is a highly invasive pest of agricultural crops, having spread and established itself in a number of countries. The *B. dorsalis* complex comprises of at least four species in India.
3. ***Bactrocera cucurbitae* (Melon fruit fly):** The melon fruit fly (Figure 3) is distributed over a wide range of climatic conditions, distributed all over the world with a host range of at least 81 plants. It is a pest of economic importance and is a major pest of cucurbitaceous vegetables including bitter gourd, musk melon, snap melon, snake gourd etc. It has a mutually beneficial association with the orchid, *Bulbophyllum patens.*
4. ***Bactrocera correcta* (Guava fruit fly):** *B. correcta* (Figure 4) makes up one third of the *dorsalis-zonata-correcta* complex of India. First reported from Bihar in the year 1916, it is now indexed as a quarantine pest by a majority of countries. In India, it has been reported from the states of Bihar, Haryana, Himachal Pradesh, Tamil Nadu, Madhya Pradesh, Gujarat, Punjab and Tripura.
5. ***Bactrocera minax* (Chinese Citrus fly):** It is a univoltine and oligophagous species causing high incidence of damage in Citrus industry (Figure 5). It was first reported in the year 1973 on tangerine and mandarin crops in Northern India. In recent years, it has been reported from tight skinned Citrus fruit crops like sweet orange, lemon, pummel and lime. It is a serious threat to Citrus industry in countries like China, Nepal and Bhutan. In India, it is mainly found in the Himalayan region. Severe damage by this insect species sometimes results in 100% losses before the end of the harvest season.
6. ***Bactrocera tau* (Pumpkin fruit fly):** It has a host range of 23 families but mainly attacks cucurbits and tomato crops in India. It is often found in competition with *Bactrocera cucurbitae* (Figure 6) in cucurbit crops. It is widespread in India but has a major pest status in the semi-hilly areas of Himachal Pradesh.
7. ***Carpomyia vesuviana* (Ber fruit fly):** It is a monophagous pest of ber (Ziziphus mauritiana) in India, widely spread in the arid and semi-arid regions of the country, especially in theh states of Rajasthan, Madhya Pradesh, Haryana, Delhi, Uttar Pradesh, Gujarat, Karnataka and Maharashtra (Figure 7). It is the most destructive pest of ber in India contributing towards the poor fruit quality and yield losses of upto 80%. Severe infestations may lead to deformation of fruits leading to fruit drop.
8. ***Acanthiophilus helanthi* (Capsule fly):** It has been reported as a pest of sunflower, safflower and soybean in India (Figure 8). In India, the fly has been reported from Delhi, Madhya Pradesh and the other Northern regions. Severe infestations lead to total loss of seeds with not a single flower head being spared. The fly also attacks young buds.

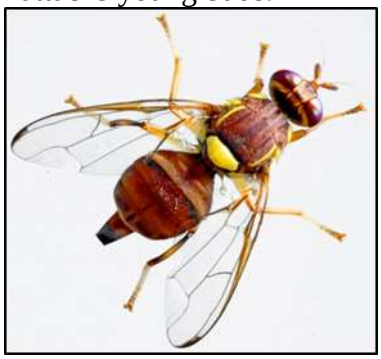

Figure 1 Bactrocera zonata (Peach fruit fly)

Figure 2 Bactrocera dorsalis (©lalatologi.com)

Figure 3 Bactrocera cucurbitae (©NBAIR)

Figure 4 Bactrocera correcta (©IAEA Imagebank)

Figure 5 Bactrocera minax (©NPPC)

Figure 6 Bactrocera tau (©CABI Compendium)

Figure 7 Carpomyia vesuviana (©iNaturalist.org)

Figure 8 Acanthiophilus helanthi (©Flickr)

Management of Fruit Fly

- Maintenance of sanitation is of the utmost importance. Follow summer ploughing to get rid of pupa in the soil.
- The flies are mainly active during fruiting season, hence pest monitoring and surveillance (using methyl eugenol lures) is essential to detect the presence of the insect
- Collect and dispose infested fruits away from the fields/orchards
- Bagging of individual fruits
- Use of natural enemies to manage insect population
- Application of bait traps (mixture of molasses/jaggery @10g/l along with an insecticide like dimethoate 30 EC1ml/l, twice at 2-week interval before ripening of fruits

One single management tactic is however not enough to manage the pest population. Management of fruit flies requires an integrated approach for its successful implementation.

CONCLUSION

Fruit fly species are a major source of economic loss in many agricultural and horticultural crops. Although some species mentioned above in details are well established, there are many minor pests belonging to the family Tephritidae, which are highly in nature and pose a threat of becoming a major pest in the future. There might be other species of this family in India which have yet to be reported. Hence, there is an urgent need to undertake surveys and study the pest complex, taxonomy, zoogeography and biology of these insect pests. A better understanding about the pest insects will make a huge contribution towards their effective management.

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