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Alarming Insect Pests, Diseases of Mango and it's Integrated Pest Management

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Abstract:

Mango is a tropical and subtropical fruit that originated in the Indo Burma region. India, China, Thailand, Mexico, Pakistan, the Philippines, Indonesia, Brazil, Nigeria, and Egypt are major mango-producing nations. With 2.5 million hectares producing 18.0 million tonnes of mangoes per year, India takes the top spot and produces almost 50% of the world's mangoes. Mangoes are reported to be infested by 400 different species of insect pests worldwide Previously regarded as minor or secondary pests, scales, mealy bugs, thrips, mites, leaf Webbers, stem borer, etc., have recently developed into a major problem. The plant's trunk, twigs, leaves, petioles, flowers, and fruit are attacked by a variety of infections caused by pathogens. Numerous anthracnose, spot, mildew, and other conditions are caused by them. In India, IPM strategies such as traditional, exploitive/maximization phase, optimization phase, sustainable phase, and organic methods have overlapped.

Key words: Mango, Pests, Diseases, IPM

Introduction:

Mango (*Mangiferaindica Linn*.) is a popular fruit all over the world and is referred to as the "King of Fruits.It is the fruit that can be grown most profitably in tropical and subtropical settings.India takes the top rank and produces about 50% of the world's mangoes, with 2.5 million hectares producing 18.0 million tonnes each year.However, a complex of insect pests is what mostly degrades the quality of mango fruits.400 distinct types of insect pests are said to infest mangoes globally (Tandon and Verghese 1985; Pena et al. 1998). Climate change has also unintentionally promoted invasive species or led to the emergence of new pests. Diseases are the main reasons for postharvest losses in mango..

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Testing and acceptance remain a substantial problem due to the complexity of biotic stress in horticulture under changing climatic settings, technology generation, and other factors, especially given the limitations and restricted capacity of smallholding farmers. In India, IPM strategies such as traditional, exploitive/maximization phase, optimization phase, sustainable phase, and organic methods have overlapped.

Pests of mango:

In India, more than 200 different species of insects attack mango, yet just a dozen of them are serious pests. These include stone weevil, hopper, mealy bug, fruit fly, scale insects, shoot gall psylla, shoot borer, leaf webber, and inflorescence midge etc.

Hopper (*Idioscopusclypealis, I.nitidulus and Amritodusatkinsoni)*

The adult insects and nymphs with wedge-shaped bodies pierce vulnerable areas of plants and consume their sap, weakening the plants' vigour and, in particular, killing the inflorescence and resulting in fruit drop. Infested tissue curls and dries out as a result of heavy puncturing and continual sap drainage. Additionally, they harm the crop by excreting a sweet, sticky material that promotes the growth of sooty mould.

Mealy bug (*Drosichamangiferae*)

The mature insects have a whitish powder covering and live in the cracks between tree trunks, new shoots, and panicles. The nymphs climb the trees and land on the inflorescence, which causes the flowers to fall and alters fruit set. Additionally, they expel honey dew, a sticky material that promotes the growth of sooty mould.

Fruit flies (*Bactrocera dorsalis, B. correctus and B. zonatus)*

With the aid of pointed ovipositor, the female makes a hole in the mature fruit's outer wall and inserts eggs in tiny clusters inside the mesocarp. Upon hatching, the maggots consume fruit pulp, and the infected fruits begin to rot as a result of a secondary infection.

Stem-borer (*Batocerarufomaculata)*

Grubs either injure the roots or the stems when they inflict damage. After emerging from the eggs, the grubs consume bark and create irregular voids. It creates tunnels that could either be tunnelling upward, which causes branches to dry up.

Shoot-borer (*Chlumetiatransversa)*

In August, larvae bore into young, delicate leaves, and newly hatched caterpillars bore into the midrib. After a few days, they bore into tender shoots close to the growth point,

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tunnelling downward, and threw their excreta, causing leaves to drop and terminal shoots to wilt.

Bark-eating caterpillar (*Inderbellaquadrinotata*)

The caterpillar builds a brown, wood- and excreta-filled silken web on the tree that resembles a zigzag ribbon. Additionally, larvae create interior resting tunnels for themselves.

Stone weevil (*Sternochetusmangiferae*)

Grubs are white, legless, and stumpy, and adult weevils (5-8 mm) are robust and dark brown. On the pericarp of sensitive fruits with a marble-sized size, eggs are placed singly. When grubs hatch, they eat the seed coat, pulp, and cotyledons before dying. There is a pupa inside the seed. When the fruit is split open, the pulp next to the troublesome stone is revealed to be discoloured.

Fruit borer*(Deanolisalbizonalis*)

A significant annoyance in West Bengal, Orissa, and Coastal Andhra Pradesh. The pest season runs from January to May. On fruit, adults lay their eggs. Fruits are pierced by larvae after hatching. Caterpillars that are fully developed (25 mm) have red and white bands alternating on their bodies. Caterpillars bore into the fruit's lower portion, or "beak," and feed within, reaching the kernels. Excreta has sealed the entrance hole. Fruits that are harmed decay and fall too soon.

Diseases of Mango:

Diseases are the main reasons for postharvest losses in mango. Mango diseases are few in number, but if they aren't well treated, they could reduce productivity.

Powdery mildew (*Oidiummangiferae)*

The disease's signature symptom is a white, superficial, powdery fungal growth on thin mature fruits, panicle stalks, flowers, and leaves.All immature tissues of the inflorescence, leaves, and fruits are parasitized by the fungus .Young leaves are attacked from both sides, although the grower is more obviously affected surface. Frequently, these patches combine to fill greater regions and turn purple brown colour.

Anthracnose *(Colletotrichumgloeosporioides)*

Young shoots, flowers, and fruits suffer substantial losses as a result of the illness. Fruits are also impacted when being stored. Leaf spot, blossom blight, withertip, twig blight, and fruit rot are some of the signs of the illness. It is simple to damage tender shoots and

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foliage, which ultimately causes young branches to "die back.". Both fruits and panicles might develop black blotches. A severe infection eliminates the entire inflorescence, which prevents fruits from setting. Young infected fruits lose their shape, get black patches, and shrivel.

Die back (*Lasiodiplodiatheobromae*)

Dieback, tip dieback, graft union blight, twig blight, seedling rot, wood stain, stem-end rot, black root rot, fruit rot, dry rot, brown rot of panicle, etc. are all caused by the same pathogen. The condition is particularly noticeable in the months of October and November.It is characterised by twigs drying out from the top down, especially in elder trees, followed by leaves drying out, giving the impression of fire scorch. When wood tissue is cut open along the long axis, internal browning can be seen.

Sooty mould (*Capnodiummangiferae)*

In orchards where mealy bugs, scale insects, and hoppers are not well controlled, the disease is widespread. A black velvety covering, or sooty mould, is present on the surface of the leaves, which serves as a telltale sign of the disease in the field. In extreme circumstances, the mould that covers the entire surface of the twigs and leaves causes the trees to turn entirely black. The amount of honey dew secreted by the aforementioned insects determines how severe the sickness is.

Malformation (*Fusariumsubglutinans*)

Vegetative malformation: Young seedlings exhibit severe vegetative malformation. The damaged seedlings produce aberrant, bloated, and internode-lengthening vegetative growths.

Floral malformation: The flower buds become vegetative buds, together with numerous tiny leaves and stems that have noticeably reduced internodes and resemble witches' brooms. The drab green flower buds hardly ever unfold.The mango bud mite, *Aceriamangiferae*, has been linked to the illness known as mango malformation sickness .

Red rust (*CephaleurosvirescensKunze*)

Mango growing regions have been shown to have red rust disease, which is brought on by an alga. The algal attack reduces photosynthetic activity and defoliates leaves, which lowers the host plant's vitality. The disease is epiphytic in nature and is easily identified by the rusty red spots that appear primarily on leaves, occasionally on petioles, and occasionally

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on the bark of young twigs. The patches have a velvety texture and have a greenish grey colour. They afterwards turn a reddish brown colour. Sometimes the spherical, slightly raised dots combine to produce larger, uneven areas.

Integrated Pest Management Practices:

The greatest technique to combating pesticide resistance is prevention, as well as incorporating tactics to manage insecticide resistance within a larger integrated pest management (IPM) strategy**.**

- After harvest, an orchard is deeply tilled to expose fruit flies, inflorescence midges, and mealy bug eggs and pupae.
- In order to manage mealy bug nymphs in their early instars in the months of November and December, rake the soil around the tree trunks and mix in 2% dust of methyl parathion at a rate of 250 g per tree.
- 15 days before harvest, place newspaper or brown paper bags over the fruit on the tree.
- To stop the migration of newly hatched first in star mealy bug nymphs in the months of November and December, 400 gauge alkathene (Polythene) sheet should be affixed to the tree trunk at a height of about 30 cm above ground level after mud plastering.
- Early fruit harvesting to prevent fruit fly infestation, as well as the gathering and disposal of fruit that has been infected.
- To control leaf webber, remove the webs it creates with a leaf-removing device and burn them in August or September.
- During these months, it is advisable to prune any diseased foliage or infected twigs.
- Use 4-5 yellow sticky traps per acre. Use a light trap at 1/acre and run it from 6 to 10 p.m.Install pheromone traps at a rate of 4–5 per acre to track the activity of adult moths (change the lures with new lures every 2–3 weeks).
- Building bird perches at a rate of 20 per acre to attract predatory birds like the king crow and common mynah.
- Use methyl eugenol to set up a fly trap as a method of male annihilation. Prepare 1 ml/l of water and 1 ml of the malathion solution with the methyl eugenol. Place 25 traps in one ha, each holding 10 ml of this combination, between 6 and 8 in the morning to control fruit flies. Hot water treatment at 52◦C for 4-5min.

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- In the fields, several parasites, predators, and pathogens are actively battling mango pests. These include the following: *Rodoliafumida, Suminusrenardi, Coccinellids, Beauveriabassiana, Verticilliumlacani, Malladaboninensis, Chrysopa species, Tertrastichus species, Trichoderma species etc.*In the field, these ought to be preserved.
- Chlorpyrifos 20 EC @ 5 ml/l of water is sprayed on the planting trenches.
- Spraying with neem seed kernel extract (5%) or imidacloprid (0.05%) or thiamethoxam (0.05%) or propanophos (0.05%) for hoppers with sulphur @ 0.2% , or tridemorph (0.1%) for mildew.

Conclusions:

The loss of natural enemies caused by the indiscriminate use of broad-spectrum insecticides has resulted in an increase in sucking pests like thrips, mites, mealy bugs, etc. Another element that added to the complexity of mango insect issues was a shift in crop phenology brought on by climate change. In order to grow mangoes that match international standards, it is necessary to strengthen sound agricultural practises, and research in this area is crucial. Semi chemicals and host plant resistance are neglected IPM elements that require immediate attention. Systemic or protectant fungicides are useful for controlling disease, but regular usage has resulted in the evolution of pathogen strains that can withstand some fungicides. Alternative disease-control strategies, such the use of bio control agents, remain underdeveloped.

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