

Important Insect Pests of Pomegranate and their Biology & Management

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SUMMARY

Pomegranate is a high value crop. The demand for fresh fruits and juice, processed products like wine and candy are also gaining importance in the world trade. It has more nutritional values and health benefits also. In the recent past, cultivation of high yielding varieties of pomegranate with intensive care and management under irrigated condition resulted in serious insect pest problems. Insect pests and diseases have a considerable impact on productivity of this crop. Pomegranate suffers from the infestation of several insect and non-insect pests. More than 86 insect pests that have been recorded to infest pomegranate crop around the world. Among these insect pests, sucking pests like aphids, thrips and fruit borer can cause 40 % yield loss.

INTRODUCTION

Pomegranate (*Punica granatum*, family: Lythraceae) is a well-known arid zone horticultural crop, which is grown all over the world and more extensively cultivated in Spain, Afghanistan, United States of America, China, Japan and Russia (Khan *et al.*, 2017). Pomegranate is a high value crop. The demand for fresh fruits and juice, processed products like wine and candy are also gaining importance in the world trade. It has more nutritional values and health benefits also. However, modern research also suggests that pomegranate is useful in treating such serious diseases like prostate cancer, skin cancer, osteoarthritis and diabetes (Bhowmik *et al.*, 2013). Pomegranate cultivation is unique because of its drought tolerant nature, consistent and good yields, fine table and therapeutic values, better keeping quality and the ability to put the plant to rest during periods when irrigation potential is low, particularly in hot semi-arid and desert regions. (Dongarjal *et al.*, 2019). In India, it is grown over an area of 2,73,000 hectares with a production of 30,68,000 tonnes and a productivity of 11.20 tonnes/ha. Maharashtra, Gujarat, Uttar Pradesh, Karnataka, Andhra Pradesh and Madhya Pradesh are the major states in pomegranate production in the country. Maharashtra is the leading state in pomegranate production as the plantation reached up to 1,47,000 hectares during 2018, with a production of 17,89,000 tonnes. However, the productivity of pomegranate crop in India is 11.20 tonnes/ha only, which is significantly lower than other pomegranate growing countries (Anonymous, 2021).

In the recent past, cultivation of high yielding varieties of pomegranate with intensive care and management under irrigated condition resulted in serious insect pest problems. Insect pests and diseases have a considerable impact on productivity of this crop. Pomegranate suffers from the infestation of several insect and non-insect pests. More than 86 insect pests that have been recorded to infest pomegranate crop around the world (Butani and Verma, 1976). Among these insect pests, sucking pests like aphids (*Aphis punicae*), thrips (*Scirtothrips dorsalis*) and fruit borer (*Deudorix isocrates*) can cause 40 % yield loss (Kambrekar *et al.*, 2015).

Important Insect Pests of Pomegranate

Anar butterfly : *Deudorix (Virachola) isocrates* (Lepidoptera: Lycanidae)

Biology:

- Single eggs are laid on sensitive leaves, stalks, and flower buds in a single layer.
- Larvae - Bark brown, short and stout, coated with short hairs, with an 18-47 day larval stage.
- Pupal phase lasts 7-34 days and occurs either inside the damaged fruits or on the stem carrying it. In 1 to 2 months, the entire life cycle is finished.
- Bluish brown butterfly, adult

Damage symptoms:

- Caterpillar bores into immature fruits and feeds on the interior contents (pulp & seeds).

Favorable conditions:

- Fruit damage appears at the age of 30 to 50 days and is most common during the 'mrig' bahar.

Cultural control:

- Take the eggs out of the calyx.
- Maintain clean cultivation since weed plants function as alternate hosts by collecting and destroying damaged fruits.

Mechanical control:

- Prune and kill the plant's afflicted sections.
- Look for drying branches on a regular basis to detect early infestation.
- Use a 1/acre light trap to monitor adult activities.

Biological control:

- Release one lac/acre of *Trichogramma chilonis*.

Thrips : *Scirtothrips dorsalis* or *Rhipiphorothrips cruentatus* (Thysanoptera: Thripidae)

Biology:

- The adults are 1.4 mm long, thin, softbodied insects with strongly fringed wings that are blackish brown with yellowish wings.
- The adult *Scirtothrips dorsalis* is a straw yellow colour.
- The nymphs are little and golden brown.
- Female produces 50 dirty white beanshaped eggs on the underside of leaves on average, with a 3-8 day incubation period.
- Nymphs are reddish when they first hatch and become yellowish brown as they mature.
- The pupal phase lasts between 2 and 5 days.

Damage symptoms:

- Both nymphs and adults feed on the underside of the leaves by rasping the surface and sucking the oozing cell-sap.
- Leaf tip turn brown and get curled, drying and shedding of flowers and scab on fruits which will reduce the market value.

Cultural control:

- Maintain appropriate aeration by correct training and trimming, and keep the basin clean.

Mechanical control:

- Detect early infestation by periodically monitoring for drying branches and pruning the affected parts of the plant.
- Use of blue sticky traps at a rate of 4-10 traps per acre

Biological control:

- To control sucking pests, defenders such as Syrphids and Coccinellids should be conserved and released.

Aphids : *Aphis punicae* (Homoptera: Aphididae)

Biology:

- Eggs: After one or two days, the eggs hatch. Nymphs are young aphids.
- Nymph: Reddish brown, oval or slightly elongated, with six segmented antennae.
- Adult: Small yellowish green fungus that colonises the upper surfaces of mature pomegranate leaves, concentrating along the midribs and along the leaf edges; also seen on blooms and, on rare occasions, fruits.

- Aphids reproduce in one of two ways: by laying eggs or by producing live young, the latter of which is dependent on environmental circumstances and food availability.
- Aphids give birth to live young when food is available.

Favorable conditions:

- Because this pest has a large number of young, a short life span, and pre-adult insects may give birth, populations grow swiftly.

Damage symptoms:

- Nymphs and adults suck the sap from leaves, shoots, and fruits, causing leaf yellowing and terminal shoot wilting.

Cultural control:

- Maintain appropriate aeration by correct training and trimming
- Use yellow sticky traps @ 4-10 traps/acre to collect and remove damaged plant portions

Biological control:

- During April, release *Chrysoperla zastrowi sillemi* first instar larvae @ 15/flowering branch (four times) at a 10-day interval from bloom initiation.

Whitefly : *Siphoninus phillyreae* (Hemiptera: Aleyrodidae)

Biology:

- Eggs: On the underside of leaves, eggs are placed in a circle.
- Nymph: small glass like wax rods along the sides of the body
- Adult: powdery white, active early in the morning.

Damage symptoms:

- Honey dew formation of sooty mould fungus
- Yellowing of foliage
- Nymphs and adults sucking sap from leaves
- Affected leaves fall off.

Cultural control:

- Maintain enough aeration by correct training and trimming
- Install yellow sticky traps at a rate of 4-10 traps per acre
- Maintain field sanitation by removing host plants

Biological control:

- Coccinellid predators, *Cryptolaemus montrouzieri*, and lacewings were released.
- Parasites such as *Encarsia haitierrsis* and *Encarsia guadeloupae* were released.

Stem borer : *Coelosterna spinator* (Coleoptera: Cerambycidae)

Biology:

- Egg: Eggs are laid in the stems of young live plants and deposited beneath the bark.
- The female lays between 20 and 40 eggs.
- Grub: Newly emerging larvae are around 1/4 inch long, while adult larvae are about 2.1/2 inch long.
- The larva feeds on the soft tissues around the oviposition chamber after hatching, then bores into the stem and roots.
- The larval phase lasts around nine to 10 months.

- Pupae: Pupae have a period of 16 to 18 days.
- Beetles have just one generation each year and live for 45 to 60 days.
- Adults are 30 to 35 mm long and have a pale yellowish-brown body with light grey elytra.
- The beetle emerges from the bark by munching a circular hole in it.
- Adult beetles are 1.1/4 to 1.1/2 inches long, dull yellowishbrown with bluish sides and legs, and a huge number of black dots ranging in size from a pinhead to minute specks on the elytra.

Damage symptoms:

- Adult beetles are active during the day and feed by gnawing the green bark of shoots; grubs bore inside the trunk and feed on sapwood; grubs bore inside the trunk and feed on sapwood; grubs bore inside the trunk and feed on sapwood; grubs bore inside the trunk and feed on sapwood; grubs bore inside the
- Excreta, holes in the bark of main stems, and dry powdery debris are common around the base of plants.

Shot hole borer : *Xyleborus perforans* (Coleoptera: Scolytidae)

Biology:

- White eggs, oval or round, gleaming and iridescent.
- Adult: 2-3 mm long, black to reddish-brown, and cigar-shaped, with white and legless larvae up to 4 mm long.
- They have a chewing mouthparts and a small, stubbed head capsule.
- Adult males do not fly.
- Every year, there are two generations.

Damage symptoms

- Adult females bore into the stem's basal section as well as the roots.
- Small shot holes on the roots, main trunk, and wilting cause the tree to wilt and eventually die.

Favourable conditions:

- They can withstand temperatures ranging from -26 to 15 degrees Celsius.
- The beetles are most active in the late afternoon or early evening, and they normally fly at or below 15 feet.

Mechanical control:

- Uproot and brunt infested trees, especially the root zone; prune and kill the plant's infected fruits and buds.
- Look for drying branches on a regular basis to detect early infection.

Mealy bug : *Ferrisia virgata* (Homoptera: Coccidae)

Biology:

- The female deposited eggs in groups in a loose ovisac of waxy fibres underneath the body.
- Fecundity (egg number) each generation varied from 109 to 185.
- The phase of oviposition lasted 20-29 days.
- The incubation time was around 3-4 hours long.
- Female and male nymphs moulted three and four times, respectively, and their development durations ranged from 26 to 47 and 31 to 57 days.
- The adult female lived 36-53 days, but the adult male lived only 1-3 days.

Damage symptoms:

- Fruit that falls off too soon.

Favourable conditions:

- Conditions that are moist and warm are favourable.

Cultural control:

- Remove alternate hosts by collecting and destroying contaminated plant components.

Biological control:

- Defenders such as Syrphids and Coccinellids should be protected and released to control sucking pests.
- Spread *Cryptolaemus montrouzieri* at a rate of 10 per tree near the mealy insect infestation.

CONCLUSION

In order to protect the crop from insect pests and diseases, farmers are spraying different chemical pesticides. Farmers rely heavily on synthetic pesticides for the control of insect pests and diseases in pomegranate. Pesticide residues in pomegranate crop are a major concern, as this fruit has medicinal benefits and is commonly used as a table purpose. Pesticide residues are also posing a significant barrier in India's exports to international markets. Recently developed selective bio rational insecticides have a useful specificity to target insects while having negligible effect on natural enemies.

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