

Insect Pests Of Flowers In Indian Himalayas Under Protected Cultivation System And Their Management

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Introduction

Floriculture or flower cultivation is considered as one of the very lucrative enterprises under the agriculture and allied industries. Flowers play a very important role in our ecosystem; they provide food for insects, birds, animals and humans. Flowers are a rich source of natural medicines and essential oils used in ayurvedic medicines. They can be used for improving the aesthetic value of a location by creating customize floral arrangements, bouquets, garlands and wraths. The large scale production of flowers in the poly houses began in the early 1990s in South and Central America; from there it spread to different parts of the world. Recently, floriculture has attracted many Indian farmers for commercial cultivation under protected poly house conditions in various states and it has become a multimillionaire industry. The flowers are mainly used for aesthetic purposes in various ceremonies and the remaining is exported to different countries of the world. The protected cultivation of flowers has its own set of problems; the major among them include insect pests and diseases. In this article, we will be briefly discussing the major flower crops cultivated in the Indian Himalayan region and their associated insect pest problems.

GERBERA (*Gerbera jamesonii*)

Whiteflies (*Bemisia tabaci*)

Symptoms and Damage: It is a serious pest of gerbera grown in poly houses. Nymphs and adults suck the plant sap and produce honeydew which in turn forms a substrate for black sooty mould fungi causing leaves to turn black and reduce photosynthesis. This leads to a reduction in plant growth and flowering.



Flies on the under surface of leaf



Eggs, nymphs and adults (enlarged)



Black sooty mould

Pest identification: The whitish sedentary nymphs can be seen sucking sap from the undersurface of the leaf and whitish adults with powdery layers on the body surface can be observed flying all around in the poly houses.

Management: Yellow sticky traps are recommended for attracting and trapping adult flies. Coccinellids especially *Serangium* sp. feed on the nymphs and adults. Alternate spray of Pymetrozine 0.3 ml/L or thiamethoxam @ 0.3 mL/L or Difenthiuron @ 0.3 mL/L is recommended. 2% detergent powder can also be mixed with the spray solution to increase the efficacy of insecticides.

Leaf miner (*Liriomyza* sp.)

Symptoms and Damage: It is a polyphagous pest attacking many crops. The adult is a small brown fly. It lays eggs on the young leaves and the emerging maggot tunnels inside the leaf and feeds on the inner tissues of the leaves and makes white serpentine mines on the leaves. Severe infestation leads to drying of leaves and premature leaf fall.



Serpentine mines on leaf



Drying of infected leaves



Adult leaf miners

Pest Identification: Tiny brownish to blackish flies can be seen hovering around the plants. The damaged leaves house the whitish maggots that are causing tunnels inside the leaf.

Management: The adults can be trapped in yellow sticky traps. Infested leaves can be removed and destroyed at the initial stage of infestation. Spray of systemic insecticides like Indoxacarb @ 0.3 mL/L or Spinatoram @ 0.3 mL/L are recommended.

CARNATION (*Dianthus caryophyllus*)

Red spider mites (*Tetranychus* sp.)

Symptoms and Damage: Mites are a serious pest of carnation grown in poly houses. They suck sap and make white feeding punctures/specks on the leaves and flowers. Severe infestation leads to the drying of leaves and flowers. They severely reduce plant growth and flowering. They cause direct economic damage by feeding on the floral parts.

Pest Identification: Webbing can be seen in the buds, flowers and leaves in which red mites are found moving. Red balls of mites can be seen on the tips in severe cases. Two-spotted spider mite, *Tetranychus urticae* have two dark spots on the body. The life cycle of mites consists of egg, larva, two nymphal stages and adults.



Severely damaged plant

White speckles on leaves

Adult mites (enlarged)

Management: Predatory mites and some coccinellids feed on the plant parasitic mites. Alternate spray of abamectin @ 0.3 mL/L or Spiromesifen @ 0.3 mL/L or Fenazaquine @ 0.3 mL/L or Hexythiazox @ 0.3 mL/L.

ROSE (*Rosa* spp.)

Aphids (*Aphis* sp.)

Symptoms and Damage: Rose aphids suck sap from the tender shoots and leaves and also from the flower peduncle. Infestation on shoots and leaves result in a distorted look whereas infestation in flower peduncles leads to drying of peduncles and improper opening or drying of flowers. They produce honeydew which encourages the development of sooty mould and reduce photosynthesis of the plant.

*Drying of flower peduncle**Syrphid laying eggs**Colony in flower peduncle*

Management: Predatory coccinellids voraciously feed on the aphids and syrphids act as important predators of rose aphids. In severe, cases spray of imidacloprid 0.3 mL/L or Difenthiuron 0.3 g/L or Thiomethaxam 0.3 g/L can be recommended.

Red Spider Mites (*Tetranychus* sp.)

*Terminal shoot damage**Webbings on tender leaves**Webbings on leaves*

For symptoms, damage and identification see under carnation

Management: Predatory mites and some coccinellids feed on the plant parasitic mites. Abamectin @ 0.3 mL/L or Spiromesifen @ 0.3 mL/L or Fenazaquine @ 0.3 mL/L or Hexythiazox @ 0.3 mL/L.

Sawfly (*Arge* sp.)

Symptoms and damage: Sawfly larvae skeletonize rose leaves. They prefer to feed on the tender leaves and feed on the outside to inwards. Usually, more than one grub is found in a single leaf hanging and eating the leaves. They defoliate the plant and during a severe infestation, the plants give grazed up appearance. The pest also attacks flowers and make them unattractive.

Pest Identification: Sawfly adults are small, dark, non-stinging wasps. The larva looks much like butterfly or moth caterpillars but can be identified by the eight pairs of fleshy legs

(prolegs) that follow the front three pairs of thoracic legs. Sawflies have five or more pairs of prolegs, while caterpillars have five or less than five pairs.



Grubs of sawfly feeding on leaf



Sawfly larvae



Sawfly adult

Management: Hand-picking or dislodging the larvae with a stick and killing them, is the best management practice. Horticultural oil, insecticidal soap and azadirachtin are reported effective against young sawfly larva. For insecticidal management, spray Spinosad 0.3 mL/L or Emamectine benzoate 0.3 g/L.

LILIUM (*Lilium longiflorum*)

Thrips (*Scirtothrips* sp. and Flower thrips – *Frankliniella* sp.)

Symptoms and damage: The larva and adults feed on the leaves and growing points by scrapping and sucking the oozing sap. The damage by thrips causes silvery leaf symptoms and typical boat-shaped leaves are formed. Plants become stunted and yield gets reduced drastically. The flower thrips feed mainly on floral parts and cause brownish discoloration of the flowers, thus reducing the market value of the produce.



Thrips in leaves



Thrips in flowers

Pest Identification: Tiny brownish insects can be seen moving rapidly on the leaves and flowers of the crop. The insects mainly feed by concealing themselves with the closed parts of the plant.

Management: Blue sticky trap attracts and traps adult thrips. A spray of imidacloprid 0.3 mL/L or Thiomethaxam 0.3 mL/L.

Chrysanthemum:**Black aphid (*Macrosiphoniellasanborni* G.)**

Symptom and Damage: Both nymphs and adults desap the tender shoots and leaves causing yellowing and drying up of tender shoots



Pest Identification: Blacking nymphs and adults of aphids can be seen feeding in small colonies under the surface of the leaf and excessive excretion of honeydew can facilitate the development of sooty mould.

Management: Predatory coccinellids voraciously feed on the aphids. In severe, cases spray of imidacloprid 0.3 mL/L or Pymetrozine 0.3 ml/L or thiomethaxam @ 0.3 mL/L or Difenthiuron @ 0.3 mL/L.

Conclusion:

Considering the severity of various insect pests under protected cultivation systems in Indian Himalayas, there is a need for proper monitoring and forecasting technologies to check their spread before they establish in a new favourable climate. The pest damage is also increasing over the years due to excessive use of low grade, locally available conventional insecticides, which pave the path for faster resistance development by insects against insecticides. So, the use of novel and safer insecticides with different modes of action can be promoted to help farmers in managing the insect pests successfully in an eco-friendly way.

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