



## Integrated management of sap feeders in citrus

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Currently, India ranks third amongst the citrus producing countries with a production of 100 lakh tons from 9.85 lakh hectare and a productivity 12.8 tons/ha at national level. The productivity and quality of citrus is severely affected by several factors; insect pests being one of them. As many as 250 insect species have been reported attacking citrus of which a dozen of them are of economic importance. Management of these sucking insect pests at the right stage drastically helps to reduce the overload of insecticidal sprays thereby assists in sustaining the productivity of the orchard. Sucking insect pests like citrus psylla, blackfly/ whitefly, aphids, thrips and leaf miner are among the important pests of three flushing seasons in citrus viz., Ambia (February-March), Mrig (June-July) and Hasta (October-November). Identification of insect pest, incidence and damage symptoms are critical for implementing appropriate control measures.

**Citrus psylla *Diaphorina citri* Kuwayama:** Citrus psylla is one of the most important pests of citrus in north India especially in Punjab, Haryana, Himachal Pradesh and Maharashtra but is of minor importance in south India. It attacks on new flush in Ambia and Mrig seasons where in nymphs and adults suck sap from just emerged shoots

and buds that results into drop of young flush, drying of twigs affecting the growth of plant. Nymphs excrete honey dew on which sooty mould grows resulting in formation of black layer on foliage as well as on fruits. Most importantly psylla is an active vector of the deadly “Greening” disease. Adults are gray coloured actively flying insects. Eggs are laid in the folds of half opened leaves or between flower buds. First instars nymphs are greenish orange in colour and later instars are of yellowish orange colour. Adults are brown in colour and transparent with red eyes. Life cycle is completed in 8 weeks with 9-10 or even 16 overlapping generations in a year.

**Citrus blackfly *Aleurocanthus woglumi* Ashbi:** Citrus blackfly is one of the economically important insect pests of citrus orchards causing heavy loss in yield and also affecting the quality of the fruit. Both nymphs and adults suck cell sap and excrete voluminous honeydew on which sooty mould grows widely that leads to fungal manifestation (*Capnodium* sp.) locally called as ‘Kolshi’ in Vidarbha region. Plants are devitalized due to excessive sap sucking and fruiting capacity of the tree is also affected adversely. About 5 to 10 blackfly adult/ cm<sup>2</sup> area or 50 to 100 nymphs/leaf are sufficient to reduce organic



Psylla adult feeding on bud burst stage



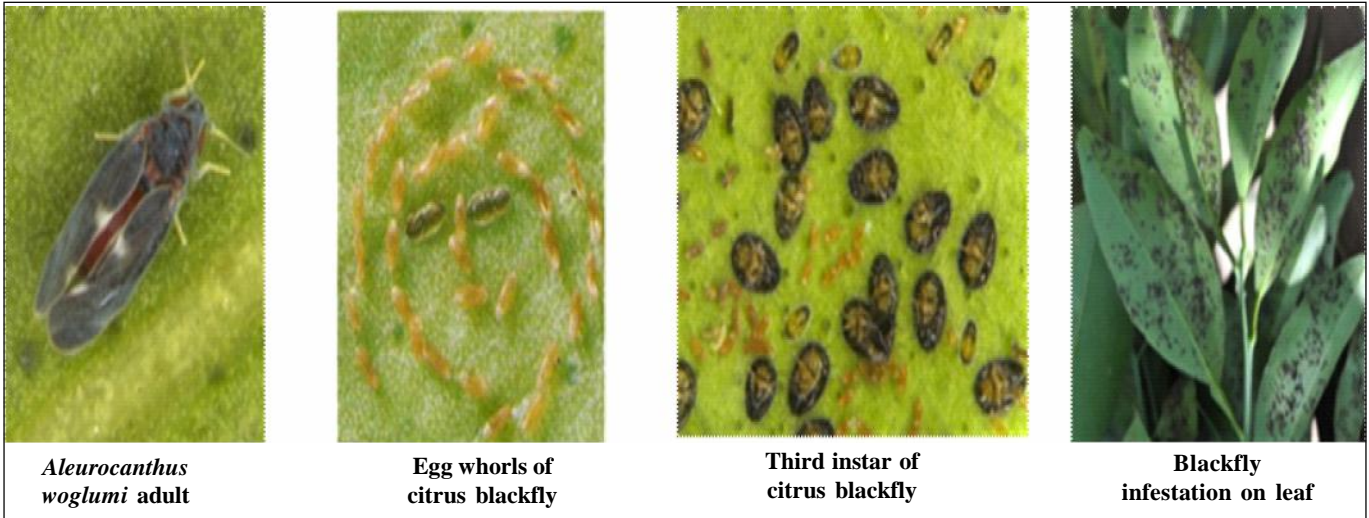
Psyllid eggs on young flush



Sugary excretion due to psylla infestation



Dried shoot tip due to psylla infestation



nitrogen content level in leaf below 2.2 per cent which is required for successful fruit set. Fruits are rendered insipid in test and blackened due to black sooty mould. Such fruits fetch low price in the market. The female of blackfly lays egg in spiral shape on the underside of the young leaves and first instar larvae are milky white in colour which later turn hyaline with transparent body which lasts for 7-30 days. Later instar nymphs are ovoid in shape with black cuticle layer over the body starting from both the ends, the middle portion of the body remain un-covered with circular dull green pairs of thick stout spines. Of the all nymphal stages, fourth instar is the only stage that lasts for maximum period. The pest has three overlapping generations in a year corresponding to three flushing seasons viz., *Ambia*, *Mrig*, and *Hasta* and life cycle takes 105, 120 and 135 days in respective season.

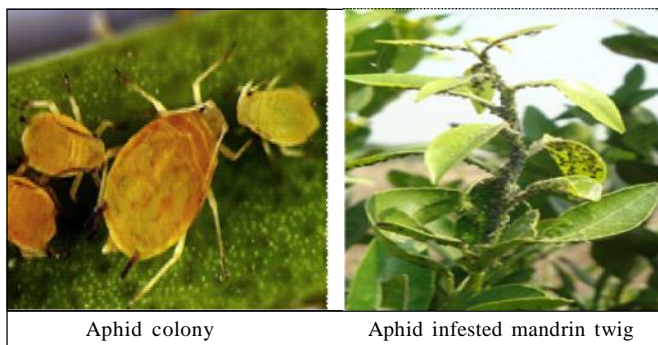
**Citrus thrips *Scirtothrips dorsalis* Hood:** Citrus thrips

are mainly pests of nursery and young plantation of citrus. It attacks tender leaves, flowers and fruits. They are usually more active during February-June on *Ambia* (January-February flowering) and July- December on *Mrig* (June-July flowering). Nymphs and adults suck the cell sap from leaves, flowers and fruits leading to distorted cup shaped, crinkled leaves and developed two whitish lines parallel to leaf midrib. Whitish silvery ring around the fruit neck or whitish irregular patches on the fruit are the typical characteristics of thrips damage on fruits. The feeding activities of thrips results in unacceptable scarring and discolouration of the rind with a consequent down grading of fruits for both export and domestic market.

**Citrus aphids, *Aphis* sp. and *Toxoptera* spp.:** Citrus aphids infestation is generally seen during winter early spring season in Nagpur mandarin on young flush. Nymphs are of varying colours ranging from dark red, bright green,







yellow to dull black. Adults are soft bodied insect, pear shaped. Both adults and nymphs suck the sap from tender leaves, shoots and flower buds which results in devitalisation of the plant. Affected leaves in severe infestation curl down affecting the growth of young flush. They multiply in hundreds in short time. They excrete honey dew like substance on which black sooty mould grows. Heavy infestation of aphid reduces fruit set. Citrus aphid *T. citricida* transmits the citrus *Tristeza* virus (CTV) most efficiently. Winged colonizing adult called ‘stem mothers’ give birth directly to nymph with no egg stage and no mating required. It completes 9 overlapping generations in a year.

**Citrus leaf miner *Phyllocnistis citrella* Stainton:** Citrus leaf miner *Phyllocnistis citeilla* Stainton is a pest of nurseries, young plantation and tender flush in citrus



Citrus leaf miner adult and larva



Silver galleries due to the feeding by leaf miner on nursery seedlings

groves. Of the total damage caused by the pests complex of citrus, 30 per cent is claimed by the leaf miner alone. The larvae feeds on the epidermis of tender leaves making serpentine mines which are silvery in colour due to entrapped air within which they remain confined for their immature life and settle down near the leaf margin. The tiny silvery moth comes out during the dusk and lays eggs on leaf buds. Infested leaves become distorted and curled up from the margins towards inner side, eventually dry and fall down. CLM prefers ventral leaf surface than dorsal for its feeding but if the infestation is heavy it start feeding on dorsal side also. Infested leaves dry and affects the photosynthesis rate and growth of plants. Leaf miner incidence usually attains its peak in February-March and July-October.

#### Management of sap feeders:

- Avoid the pruning during active growth periods as it induces further new flush and thereby allow the sucking pests to have more number of generations. If necessary, prune only the infested shoots during winter from the inner canopy.

- Collateral host like *Curry leaf (Murraya koengii* Linn.) plant should not be grown in the vicinity of citrus orchards as it may act as a breeding ground for psylla.

- Conserve the bio-agents (Coccinellids, Chrysopids predators and eulophid parasitoids) by avoiding application of insecticides during late winter to early spring.

- The parasitoids, *Citrostichus phyllocnistoides* (Narayanan), *Cirrospilus quadristriatus* (Subba Rao and Ramamani) for citrus leaf miner and the predators, *Mallada desjardinsi*, *Coccinella septempunctata* Linnaeus, *Cheilomenes sexmaculata* (Fabricius) were identified as predominant bio-agents of leaf miner in central India. Two releases of *M. desjardinsi* @ 30 larvae / tree in each flushing season effectively checks citrus psylla. *Tamarixia radiata* Waterston, *Tetrastichus* spp. and *Diaphorencyrtus aligharensis* have been found parasitising the psylla population.

- Foliar application of *Nem* oil 5 ml or dimethoate 30EC @2 ml or imidacloprid 17.8 SL@0.5 ml or fenvalerate 20 EC@1.0 ml during bud burst stage for citrus psylla, coinciding with adult emergence or 50 per cent egg hatching for blackfly/whitefly, flush emergence for citrus leaf miner, aphids and thrips, fruit setting stage for thrips checks the pest. Need based second spray may be carried out if the pest population is above ETL.