

## Pest of litchi in India and their control

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LITCHI (lychee), *Litchi chinensis* SONN. (nec *Nephelium litchi*) is a delicious fruit of Chinese origin, introduced in India, Bangla desh and Burma via Japan during the end of 17th century. Subsequently it also spread to other countries like Hawaii, N.E. Australia, New Zealand, Formosa, Mauritius, South Africa, Florida (USA), West Indies and Brazil. Litchi is rather exacting in its climatic requirements. It requires moist temperate climate without heavy frost in winter and dry heat in summer (THAPER, 1961). Hot dry winds or drought during summer when fruit is ripening are definitely undesirable as these cause splitting of fruits. Litchi fruits contain 15 % soluble sugars and 1.15 % protein. It is rich source of vitamin C and also contain fair amount of phosphorous, calcium and iron (SINGH, 1958). There are more than 10,000 hectares under litchi in India ; of which over 8000 hectares are in North Bihar and remaining 2000 hectares are spread over the sub-montane districts of Uttar Pradesh, Himachal Pradesh and Punjab. There is a great scope of increasing area under this fruit specially along the foot of the Himalayas in Himachal Pradesh and Uttar Pradesh. Production-wise, Kwangtung and Fukien provinces of China stand first in the world followed by Muzaffarpur, Darbhanga and Samastipur districts of Bihar (India).

Litchi trees are attacked by number of pests - both insects and mite (ALCOCK, 1903 ; FLETCHER, 1921 ; SINGH and SINGH, 1954 ; WADHI and BATRA, 1964 ; VEVAI, 1971 ; HUKAM SINGH, 1975). Tree trunks and thick branches are damaged by bark boring caterpillars ; leaves are attacked by leaf curl mite, aphids, scale insects, bugs, whiteflies, thrips, leaf miners, leaf eating caterpillars, leaf rollers, beetles and weevils, stem borer and red ants while fruits are spoiled by fruit and seed borers including anar butterfly. Fortunately, most of these are either sporadic or of minor importance ; only leaf curl mite and bark boring caterpillars often cause serious damage.

### LEAF CURL MITE.

Erinose or leaf curl mite, *Aceria (Eriophyes)* species is the most destructive pest of litchi and has been reported from almost all the litchi growing countries of the world. The specimen from Hawaii have been described as *Aceria (Eriophyes) litchi* (KEIFER, 1943) ; the species has also been subsequently reported from Bangladesh (ALAM and WADUD, 1964). In India, these mites have been reported from Jalpaiguri (West Bengal), North Bihar and parts of Uttar Pradesh. These are specific pest of litchi. Young plants and seedlings in nursery are more liable to attack. Both nymphs and adults are usually found near the base of hairs of ventral leaf surface. They puncture and lacerate the tissues of leaf with their stout rostrum and suck the cell sap. Chocolate brown velvety growth on the ventral surface of leaves is the characteristic sign of attack by this pest. In the beginning small deep excavated pits may be found lined throughout with brownish velvety pubescens and when these coalesce, the leaves curl up apically or double over vertically forming hollow cylinders ; ultimately the attacked leaves wither and fall down. No sooner the withering of leaves start, good many mites move upwards to infest the fresh succulent leaves. The attack by these mites generally begins from lower portion of the tree and gradually extends upwards.

Eggs are extremely small (0.04 mm in diameter), round in shape and whitish in colour. Nympha and adults are similar in appearance, only the nymphs are smaller in size than adults and have lesser number of lateral setae. Both are minute veriform four legged animals, whitish in colour with only two pairs of legs situated at anterior end ; abdomen greatly enlarged having innumerable ring like segments. Adults are 0.15 to 0.2 mm long, while the nymphs are microscopic. Eggs are laid singly on the ventral side of leaves at the base of hairs. Incubation period is 2-3 days, nymphal 8-12 days and adults live for 2-3 days. Sexual dimorphism is evident only in adult stage. Overwintering is in adult stage ; these adults start multiplying as soon as the temperature rises (around March)

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and the peak activity has been observed around July.

Collect all the infested leaves and either burn these leaves (HAYES, 1957) or bury the same fairly deep. ROY and DE (1950) suggested spraying with 0.5 % DDT. NISHIDA and HOLDAWAY (1955) recommended spraying with wettable sulphur (100 gm in 20 litres of water). One spraying in May-June (after harvest of fruits) and again one to two sprayings in winter (December-January) when the trees are dormant and the mites are torpid with cold has been found to be very effective.

#### BARK BORING CATERPILLARS

*Indarbela quadrinotata* (WALKER) and *I. tetraonis* (MOORE) are the common pests found specially in old and neglected orchards. These are both polyphagous pests and their hosts among the fruit trees include, aonla (*Emblica officinalis*), ber (*Zizyphus* spp.), citrus, falsa (*Grewia asiatica*), guava, jack fruit, jamun (*Syzygium cumini*), litchi, loquat, mango, mulberry, pomegranate, etc. (VERMA and KHURANA, 1974).

The freshly hatched larvae nibble the tree trunk and after 2-3 days bore into the same and feed within. This interrupts with translocation of cell sap, with the result the growth of the tree is arrested and fruiting capacity, adversely affected. Caterpillars also spin silken webs containing their excreta and chewed woody particles; these webs are seen hanging loosely on tree trunk, more commonly near the forking of main branches.

Eggs are laid around April-May, these hatch in about a week. The caterpillars become full grown by December but continue to feed till March-April and then pupate. Pupal period is about three weeks and there is only one generation a year.

To control these boring caterpillars, clean the affected portions of the tree by removing all the webs and plug the holes by inserting a swab of cotton wool soaked in any good fumigant like, petroleum, chloroform, carbon bisulphide, formalin, etc. and then sealing the holes with mud. Such of the holes as may reopen, need be retreated. SHAH (1946) considered use of these chemicals to be expensive and suggested introduction of hot water into the holes by means of a cheap syringe. This method is rather cumbersome and non practicable specially in case of big orchards. KHURANA and GUPTA (1972) have suggested injecting in the holes 0.013% dichlorvos (DDVP), 0.05% trichloroform or 0.05% endosulfan.

In addition to *Indarbela* spp., SINGH (1954) recorded *Lymantria mathura* MOORE from Uttar Pradesh, damaging inflorescences and bark of litchi and mango trees. Egg, larval and pupal periods occupy, 8-10; 20-22 and 8-10 days respectively. Adults exhibit dimorphism. Fore-wings of both the sexes are white with brown patches; wing expanse being on an average 44 and 88 mm in case of males and females respectively. Hind-wings of males are

light orange with brown patches and those of females are white with brown margins. ALAM et al (1964) reported *Zeuzera coffeae* NIETNER as major pest of litchi in Bangladesh boring the bark of the trees. This pest occurs in India, but not on litchi; WADHI and BATRA (1964) reported this as a minor pest of pomegranate.

#### APHID

Citrus aphid, *Toxoptera aurantii* (BOYER de FONTS) is found universally (CIE map No. A-131). Its main host is citrus and alternate hosts include, tea, coffee, cocoa (HILL, 1975) and litchi. It is also found in green-houses on a variety of plants. Clusters of blackish-brown aphids (nymphs and adults) may be seen on flush foliage. These suck the cell sap, resulting in distortion of young leaves. Aphids also exude honeydew which falls on the lower leaves and twigs. On this honeydew, sooty mould grows rapidly, covering the entire surface. As a result of this black coating, growth of the tree is retarded and finally the fruiting capacity is also affected. Dry weather followed by rainy season is most favourable for their rapid multiplication which is usually parthenogenetically.

To check the aphid population, spray 0.03% phosphamidon, dimethoate or monocrotophos. Repetition may be necessary after an interval of 8-10 days, if the attack is severe. These sprayings will also control whiteflies etc., if any.

#### SCALE INSECTS

Soft scales, *Chloropulvinaria psidii* (MASKELL), *Parasaissetia nigra* (NIETNER), *Saissetia coffea* (WALKER) and *Geococcus radicum*; hard scales *Aulacaspis* species, *Fiorinia nephelii* MASKELL, *Parlataria pseudopyri* KUWANA and *P. cinerea* DANNE and HADDEN; lac insect *Tachardia albizziae* (GREEN) have been reported so far on litchi trees. None of these have been found to cause any severe damage. If and when these coccids appear, remove and destroy the infested leaves and twigs.

#### BUGS

Pentatomid bugs, namely, *Halys dentatus* FABRICIUS, *Tessaratoma javanica* THUNBERG, *T. quadrata* DISTANT and *Chrysocoris stolii* (WOLFF.) have been reported on litchi trees. *H. dentatus* is a major pest of jamun and mulberry. *C. stolii* is specific to litchi and is active throughout the year except December and January. Incubation and nymphal durations are 5-7 and 19-29 days respectively (SINGH and SHARMA, 1961). BHATTACHERJEE (1959) reported lygaeid bug, *Lygaeus (Spilostethus) pandurus* SCOPOLI. This is a polyphagous pest and has also been reported damaging apple, apricot, citrus, fig, grapes, jamun, mango, peach, pear, plum, pistachio (*Pistacia vera*), various vegetables, etc. Besides sucking the cell sap from leaves and

tender shoots these bugs also inflict injury to flowers and tender fruits. The affected flowers dry and wither away without forming fruit while the fruits when attacked drop down pre-maturely. Incubation period is 4-5 days ; nymphal 25-33 and 28-38 days during summer and winter respectively while the adults live for about a month.

Spray 0.05% dichlorvos (DDVP) or 0.04% diazinon to combat these bugs.

#### WHITE FLIES

According to WADHI and BATRA (1964) two species of whiteflies, namely *Aleurocanthus husaini* CORBETT (1939) and *Dialeurodes elongata* DOZIER (1928) have been reported on litchi. The main host of both these species are *Citrus* spp., though *A. husaini* has also been recorded on peach, pear and plum. These insects suck sap from ventral surface of leaves as also tender shoots. In case of severe infestation, which is rare, the affected leaves turn pale and become under-sized.

Spray with 0.03% phosphamidon, monocrotophos, dicrotophos or dimethoate, if and when necessary. This will also control the thrips, if any.

#### THRIPS

ANANTHAKRISHNAN (1971) reported *Dolichothrips indicus* HOOD and *Megalurothrips (Taeniothrips) distalis* KARNY attacking flowers and leaves respectively. NAYAR et al (1976) also reported *M. usitatus* BAGNALL on flowers. These are tiny, slender, fragile insects ; adults having both pairs of wings heavily fringed. Both nymphs and adults scrap the epidermis and suck the sap, oozing out of these wounds. In case of leaves, the thrips are found near the tips and the affected tips subsequently curl and dry away. The affected flowers also get devitalized and dry away.

To control, spray 0.03% phosphamidon or dimethoate.

#### LEAF MINERS

*Acrocercops heirocosma* MEYRICK has been reported from Eastern India and Bangladesh (FLETCHER, 1916 ; ALAM et al, 1964) while *A. cramerella* SNELLEN has been reported from Bihar (FLETCHER, 1933) and Uttar Pradesh (HUKAM SINGH, 1975). The caterpillars may be seen mining the leaves during August to October. *A. cramerella* caterpillars have also been observed damaging the ripe fruits of litchi. As the damage caused by these pests is generally negligible, no control measures are normally warranted. However, HUKAM SINGH (1975) found spraying with 0.05% quinalphos, fenitrothion or dichlorvos (DDVP) to give cent per cent mortality in 24 hours.

#### LEAF EATING CATERPILLARS

LEFROY and HOWLETT (1909) reported caterpillars of *Selepa (Plotheia) celtis* MOORE, *Sympis rufibasis* GUENEE and *Thalassodes quadraria* GUENEE feeding on leaves. FLETCHER (1933) also recorded *Odites spoliatrix* larvae. One or the other species of these caterpillars is often found eating away the leaves and leaving behind hard midribs. As none of these is of major importance, no work has been done on their bionomics, etc. Nevertheless, if and when these caterpillars appear in good number spray 0.05% endosulfan or 0.1-0.2% carbaryl.

#### LEAF ROLLERS

*Cacoecia epicyrta* MEYRICK, *Argyroplote leucaspis* MEYRICK and *A. aprobola* MEYRICK have been recorded as leaf rollers (WADHI and BATRA, 1964) ; the last one also damages the flowers by webbing the same. *C. epicyrta* is polyphagous and have also been found damaging apple, apricot, citrus, guava, jamun, peach, etc., whereas *A. aprobola* has been recorded only on jamun and mango. In case of severe attack by these leaf rollers, the fruit setting capacity of the trees is adversely affected.

Collect and destroy rolled leaves and webbed flowers in the initial stage of attack ; if the attack be severe, spray 0.03% phosphamidon or 0.05% fenitrothion or 0.05% endosulfan.

#### WEEVILS AND BEETLES

Plum weevil, *Amblyrrhinus poricollis* BOHEMANN, apricot weevil, *Myloccerus discolor* BOHEMANN and grey weevil, *M. undecimpustulatus* FAUST are all polyphagous pests found commonly on almond, apple, apricot, ber (*Zizyphus* spp.) litchi, mango, plum, etc. *M. discolor* is also found on grapes, loquat, etc. and *M. undecimpustulatus* on guava, peach, pear, pomegranate and strawberry. HUKAM SINGH (1974a) also recorded *M. delicatulus* BOHEMANN and NAYAR et al (1976) reported *Ptochus* species feeding on tender leaves of litchi. Adults of these weevils are seen nibbling the leaves from margins. SINGH (1971) recorded maximum incidence of *Myloccerus* spp. during November to February and lowest in summer (April to July).

Spraying with 0.04% diazinon or dichlorvos (DDVP) or 0.05% fenitrothion is effective in checking the population of these weevils.

HUKAM SINGH (1974 b) observed adults of *Apoderus blandus* FAUST eating chlorophyll of young leaves. For oviposition, the females roll the leaves transversely into a compact cylindrical shape and lay a single egg inside. On hatching the larvae feed within these rolls and the rolls subsequently fall down. Besides, chrysomelid beetles, *Dia-pormorpha melanopus* LACORDAIRE and *Cryptocephalus insubidus* SUFFRAIN have also been reported by ALCOCK

(1903) and HUKAM SINGH (1975) respectively feeding on litchi leaves.

### SHOOT BORER

*Chlumetia transversa* WALKER is widely distributed all over India attacking mango and litchi. The freshly hatched caterpillars bore into midribs of tender leaves; later these bore into the tender shoots near growing point, tunnelling downwads. Leaves of affected shoots wither and drop down. Full grown larvae is 14-18 mm long, pink with dirty spots. Adults have beautifully patterned forewings; wing expanse being 11-13 mm. Egg, larval and pupal durations are 2-3, 10-12 and 15-18 days respectively (SINGH, 1957) and the pest overwinters (October to March) in pupal stage.

According to TANDON et al (1975), two to three sprayings with 0.02% carbaryl at tri-weekly interval keeps the pest population under check.

### RED ANTS

*Oecophylla smaragdina* FABRICIUS have been reported from various countries extending from Australia to Africa. The ants stitch together a few leaves usually at the top of the branches and built their nests in citrus, coconut, jack fruit, jamun, litchi, mango and sapota (*Achras sapota*) trees etc. These ants are carnivorous and active all the year round; the activity slackens during monsoon months and gets a flip on sunny days. These ants have been found protecting scale insects and aphids from being preyed upon by the parasites and predators and also carry the

nymphs of scale insects from tree to tree. Besides, being very ferocious, these are a source of nuisance to the pickers and other workers, who often get badly bitten by these ants. Egg, larva and pupa are all white in colour and their durations occupy, 4-8, 10-17 and 5-7 days respectively (DAVID, 1961).

To control these ants, it is recommended that their nests be removed and destroyed mechanically or the same should be sprayed to run off point with 0.1% BHC (BUTANI and TAHILIANI, 1974).

### FRUIT AND SEED BORERS

*Virachola isocrates* FABRICIUS is a polyphagous pest having a very wide range of host plants including litchi, while *Argyroploce illepida* BUTLER (= *Cryptophlebia carpophaga* WALSINGHAM) has been reported as a pest of bael (*Aegle marmelos*), ber, citrus, litchi, tamarind, etc. According to FLETCHER (1920) larvae of *A. illepida* bore into the litchi seed. SINGH and SINGH (1954) also reported *Deudorix epijarbas* MOORE attacking the fruits and NAYAR et al (1976) mention *Rapala* species as fruit borer. All these are minor pests.

### NON INSECT PESTS

According to SINGH and SINGH (1954), squirrels, bats and birds specially crows do much harm at the time of fruit ripening. These may be scared away by making some noise near the trees. Covering the trees with net has also been suggested but it is rather expensive and not practicable in orchards.

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