

# Study of Major Litchi Pests (*Litchi chinensis* Sonn.) and its Related Diseases

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## ABSTRACT

The pest of litchi consist of insects and mites. Field surveys carried out in litchi growing areas of North Bihar during 2012-13 revealed the occurrence of two insect species in severe form which were hither to either unnoticed or of minor importance. They were *Apoderous* sp., a weevil and *Conopomorpha cramerella*, a borer pest on fruits. The weevil was brownish red in colour, about 5-7 mm in length and with a strong rostrum, causing heavy damage to new flush. Young growing tree of less than five years age were devastated. Similarly a change in disease complex also has been observed. Twig blight symptoms in young orchard were aggravated by leaf feeding insect pest complex. Another such disease is 'litchi sudden death disease'. Young trees of litchi were found to wilt in less than a week time at NRCL experimental farm. A few mycoflora has been consistently isolated associated with fruit drop. The field collected samples of litchi fruits, affected by fruit cracking, revealed that the exposed aril in the cracks was colonized by *Aspergillus flavus*. There is apprehension that juices may get contaminated with aflatoxins if inferior quality raw material is used by processors for juice preparation. The changing dynamics of pests and the emerging new pests and diseases may become a hindrance to profitable litchi cultivation and will have socio-economic impact on litchi growing areas.

## 1. Introduction

Litchi (*Litchi chinensis* Sonn.) has been acknowledged as one of the most precious fruits of the world. India is the second largest producer of litchi after China. The litchi erineum mite is one of the most destructive pest of litchi in all litchi producing countries of the world. The pest has now established itself as one of the major pest of litchi in India Particularly in Bihar and Uttar Pradesh. Among many factors affecting production and productivity, insect pests and post-harvest losses are a major constraint. As a result of its feeding, under surface of the infested leaves show abnormal growth of epidermal cells in the form of hair like velvety growth of chocolate brown colour. Major insect pests recorded on litchi are leaf mite *Aceria litchii* (Keifer), leaf miner (*Conopomorpha cramerella*), fruit borers (*Conopomorpha cramerella*, *Platyepplus aprobola* Meyer and *Dichocrosis* sp.), leaf webber/ roller (*Platyeppla aprobola* Meyer), litchi bug (*Tessarotoma javanica* Thunb), bark eating caterpillar (*Indarbela quadrinotata* and *I. tetraonis*) and shoot borer (*Chlumetia transversa*) etc. Borer complex of litchi is most important as it extensively damages the developing and matured fruits reducing the marketable yields. Among the diseases of at pre-harvest occurrence, anthracnose caused by *Colletotrichum gloeosporioides* Penz. is of economic importance, and the post-harvest losses due to fruit rots caused by several pathogens (*Aspergillus*, *Cylindrocarpon*, *Botryodiplodia* and *Colletotrichum* etc) are also of concern (Prasad and Bilgrami, 1974; Awasthi *et al.*, 2005). In continuous monitoring of insect pests and diseases in litchi growing areas of Bihar and at experimental farm of National Research Centre for Litchi (NRCL), Mushahari, Muzaffarpur, Bihar, a few species of emerging threats in the form of insects pests and diseases were observed.

## 2. Materials and Methods

In order to evaluate the pest management strategies, field trial was conducted at the National Research Center for Litchi (NRCL), Mushahari, Muzaffarpur. Incidence of pests and diseases was recorded in the litchi orchards in Mushahari and Kanti blocks of Muzaffarpur District and at National Research Center for Litchi (NRCL) experimental farm during 2012 and 2013. The experiment was laid out in randomized block design with litchi cultivar. Ten trees in each block were randomly selected for sampling of foliage damage by insect pests and foliar diseases. Infestation levels of pests and severity of diseases were recorded based on the per cent leaf damage during vegetative phase. Insect morphology was studied with the help of a stereo binocular microscope. The insect species were got identified by taxonomists. For studying sudden death disease, the infected roots, bark, stem and branches were passed through the process of isolation as described by Pathak (1987).

## 3. Results and discussion

There was a need to test the effectiveness organic components with Bio-Pesticides against the pest activities and also its impact on fruit yield yields to achieve sustainable productivity with minimum deleterious effects of chemical fertilizers on soil health and the environment. Roving and fixed plot surveys of litchi orchards revealed the occurrence of a weevil causing severe leaf damage on young shoots. It was bright brownish red in colour, about 5-7mm in length and having elongated snout. It was found feeding on young foliage during November 2012 and in subsequent months during 2013. It was a solitary feeder but extensively damaged young foliage and shoots. The insect fed on leaves by pricking the surface of leaf (Fig. 1 and 2). As a result of feeding, leaves dried up from the pricked parts giving blighted appearance to the twigs.

Young growing trees of less than five years age were devastated. Infestation of the weevil was observed throughout the year but was less during December and January due to extremely low temperature. Considering the extent of leaf

damage it causes, it can be regarded as second only to fruit borer in economic importance. Therefore present investigation was undertaken.



Fig. 1 and 2: Damage of newly emerged foliage by the weevil.

Morphology of adult weevil was studied in detail. The insect belongs to the order Coleoptera, super family-Curculionoidea, family Attelabidae. The head, prothorax and elytra were bright brownish red (Fig. 3 and 4). The ventral side (abdomen) was pale brown, and parts of the mouth and claws were brownish red. The head was elongated triangular, strongly constricted behind. The antennae were distinctive, straight i.e. without a developed scape, and with a loose three segmented club, inserted in a prominent zone of the dorsal surface of rostrum. It has flat, almost parallel-sided elytra without any protuberances. Legs were long and femora are

clavate. Based on the characteristics of the weevil it was identified as *Apoderus blandus* Faust. However, it differs from typical *A. blandus* in having brownish red colour of head, prothorax and antennae. This may be due to intra-specific variation or may be a new species hitherto not reported from litchi. Singh (1974) had reported infestation of *A. blandus* in litchi from Saharanpur, U.P. (India). However the symptoms described by him i.e. transversely rolling of young leaves due to eating of chlorophyll, was not observed in the present case.

Further, the characteristics of the insect were not described by him.



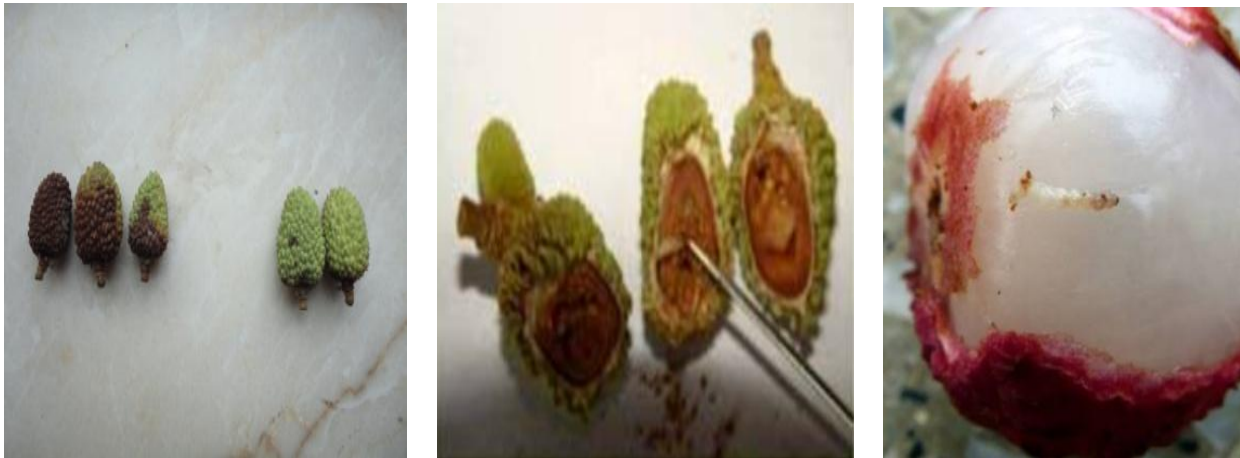
Fig. 3 and 4. Different views of adult weevil

The pest dynamics has been changing over time. Litchi mite and litchi bug have now become economically less important. Their incidences have been very low during the year of study. Instead, high infestation of foliage feeders such as,

leaf miner, leaf roller, leaf cutting weevil, and shoot borer were noticed limiting young tree growth. The old orchard was found affected by infestation of bark eating caterpillar. Mealy bugs were also

recorded in few cases. A complex of fruit borers has emerged as the most important constraint inflicting high economic losses to growers. Due to the changing dynamics of pests, *Conopomorpha cramerella* which was earlier regarded as minor pest have become very serious, affecting litchi cultivation not only in Bihar but also in other states like Uttar Pradesh. Generally, two generation of this insect occurs during litchi season. Earlier the fruits infestation that occurred during May (Fig.5) was important but now the generation which starts in March, when the litchi fruit (18-20mm length) is still in stage I of development (growth of pericarp and seed coat) have become important. A large number of fruits drop due to early infestation of this pest (Fig. 6 and 7). Overlapping generations during the fruiting period (April to June) have been observed.

Indiscriminate use of pesticides to control fruit borer complex in litchi, particularly synthetic pyrethroids by the farmers seem to be responsible for high incidence of *C. cramerella* in litchi orchards. The management of fruit borer complex hence warrants the integration of alternative methods such as use of pheromone trap, biocontrol agents (*Trichogramma* sp.), removal and destruction of dropped fruits and wild host such as *Eugenia jambolana* and *Cassia tora* from orchards, prophylactic spray of neem (*Azadiracta indica*) based insecticides and need based application of chemical insecticides. Minimal uses of pesticides in litchi are more relevant because of greater hazards of pesticide residues in the fruits.



**Figs. 5: Early infested fruits, 6: Larvae of *C. cramerella* inside developing seed, and 7. Larvae and symptoms of infestation in mature fruit.**

Among emerging disease problems, 'twig blight' is very important. The symptoms appeared as death of leaves on new shoots and a foliar blight and tip dieback which is difficult to separate. The leaf blight appears as tan spots on the leaves. The afflicted leaves look like they are scorched from the sun (Fig. 8 and 9). The severity of the twig blight was as high as

100 per cent in some plants. The twig blight along with infestation of foliage feeding pest complex particularly, the new weevil pest, leaf miner, leaf cutting weevil and shoot borer not only severely hampered the young plants' growth but also reduced the potential fruit bearing flushes in grown-up orchards.



**Fig. 8 and 9: Symptoms of twig blight disease**

Another emerging disease observed was 'litchi sudden death'. Young trees of litchi, less than five year age were found to wilt in less than a week time at NRCL experimental farm and

such reports were also received from some farmers' fields. More than sixty plants were died during two years at NRCL experimental farm. The first symptoms noticed in the field is

yellowing of foliage followed by gradual wilting and drying, leading to complete death of the plant within 4-5 days (Fig. 10). When the disease occurred, some brown spots first appeared on the root crown and lateral root phloem, spreading later to the xylem. More number of plants was affected by the disease in drip irrigated plots. Comparatively less spread of the lateral

roots of plants in drip irrigated blocks may be one of the factors for more number of affected plants in such blocks. There was an invariable association of *Botryodiplodia* sp, *Fusarium solani* and *Colletotrichum* sp. in the affected roots examined, although their pathogenicity is yet to be proven.



Fig. 10: Symptoms of litchi sudden death disease (A, B, C and D - Four stages of wilting)

The field collected samples of litchi fruits affected by fruit cracking revealed that the exposed aril in the cracks was colonized by *Aspergillus flavus* (Fig. 11) besides other fungi. Often inferior quality fruits go in processing. Given the current

processing practices followed by some processors, there is apprehension that juices may get contaminated with aflatoxins if such raw material is used by processors for juice preparation.



Fig. 11: Colonization of fruit cracks by fungi

The mycoflora associated with fruit drop was isolated and studied. A few fungal genera found consistently associated were *Colletotrichum* sp. and *Oidium* sp. This support the hypothesis that not only the fruit borer complex but the fungal pathogens, particularly powdery mildew may be the cause of heavy fruit drop even at later stages of fruit development. Sporadic occurrences of leaf spots caused by *Botryodiplodia* sp. and *Colletotrichum gloeosporioides*, which begin at the tip of the leaflets, and the 'bark splitting' on main trunk of 5-8 year old plants, between collar zones to a height of 2-3 feet, were observed in various orchards. To conclude, our studies revealed *Apoderous* sp. as an emerging threat to litchi and in all probability, this is the first report of the species on litchi. Borer problem is growing every year and needs concerted

efforts to check its spread. Besides, the twig blight and the litchi sudden death disease. The detailed studies about managing the emerging problems are being carried out at NRCL, Muzaffarpur.

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