CHAPTER 15

DISEASES

Litchi plants as compared to many fruit bearing species are least affected by diseases. Diseases are more important after harvest, although undoubtedly many of the fruit are infected before picking. There are a few organisms that infect the leaves, flowers and fruit, and a few others associated with tree decline and tree deaths. A few leaf spot diseases have come to light which are caused by fungal pathogens. No bacterial or viral infections have been reported so far. A few reports of algal infections are also available.

1. Brown Blight

It is known as blossom blight or downy mildew and caused by *Peronophythora litchi*. It attacks both young and ripe fruit, pedicels and leaves of litchi (Fig. 15.1). The infection reduces production and shelf life. Flower panicles are particularly susceptible. Browning of flowers and desiccation of panicles, attacking young and ripe fruits causing brown lesions and white downy growth or premature fruit drop are the symptoms. Immature fruit turn brown, while those infected before harvest have a white mildew growing on the skin. The pathogen probably persists as zoospores or dormant mycelium in the soil or in plant debris. Higher temperatures during the day are suitable for sporulation, germination and infection by the pathogen, and lower temperatures and high humidity at night facilitate zoospore release and distribution. Continuous rain and re-infection are the most important factors leading to the wide distribution of this disease.

Fig. 15.1: Brown blight

Management

- Cleaning up the orchard by removing shaded, infected and dead branches after harvest.

- Copper oxychloride spray during winter and copper sulphate in spring also help to reduce inoculum levels.
- Metalaxyl spray during flowering and fruit development, reduces the disease occurrence

2. Anthracnose

Fig. 15.2: Anthracnose affected fruits of litchi

In anthracnose, caused by *B. theobromae,* the spots usually start from the tip or the margin of the lamina. These spots are deep chocolate in colour. The limiting margins of the spots with irregular outline are vandyke brown. Black pycnidia appear on both the surfaces of the leaves but more often on the upper one. These spots are irregular in outline and are brick brown in colour with prominent marsh brown margins encircling them. Mummy brown waxy subepidermal acervuli appear on both the surfaces of the infected leaves but especially so on the upper one. Anthracnose (*Colletotrichum gloeosporoides)*, attacks leaves and branches, along with flowers and flower stalks, and fruit (Fig. 15.2). Lesions on the leaves may appear as small round light grey areas, or irregular brown marks at the tips. In contrast, infections are much more obvious on the flowers and fruit. Outbreaks are common after warm wet weather. The infection remains restricted to lower surface. Under no circumstances upper surface of healthy leaves get infection. During the rainy season, the rain water trickling through the diseased leaves is richly laden with the spores of the pathogens to cause further infections. The fungus may not always cause immediate disease, which sometimes only becomes apparent after harvest. Fungicides are used during an initial outbreak, but are not always effective. Prevailing climatic conditions (high temperature and high relative humidity) are highly conducive for the development and spread of anthracnose. The higher the latent infection rates of anthracnose of the fruits causes more serious the postharvest decay and browning of the fruits.

Management

- Avoidance of overcrowding of trees and branches in orchard.
- Pruning of affected plants and burning has been suggested to minimize the chances of fresh infections.
- Copper oxychloride spray has been found effective but calendar sprays of copper are costly and could lead to unacceptable residues if used close to harvest. Spray of 3:3:50 Bordeaux mixture in February, April and September-October or application of Caption 50 WP @ 0.2% is effective.
- The rates of latent infection of the fruits could be evidently controlled by integrated

management of the disease in the growing season, and the post-harvest decay and browning of the fruits are effectively reduced. The effect of storage can be improved when the measure is applied to control the latent infection of anthracnose on litchi fruit before harvest.

3. Tree Decline and Root Rot

A slow decline and a sudden death have been recorded in litchi. It can affect the whole tree or just one or two branches (Fig. 15.3). The symptoms include a sudden branch wilt that is followed by the decline of new growth on the affected branch over a period. In other situations, the tips die without wilting. The tree or branch may recover temporarily, but subsequently dies. Parts of the tree flush and grow, while other sections die. A number of organisms including *Phytophthora*, *Pythium* and *Fusarium* have been isolated from the roots of trees, but it is not known where they cause the disease. The fungus may survive in the soil or on stumps and roots of various trees for many years.

In some parts of litchi belt, trees are killed by the root rot. Some isolated cases of root collar rot caused by *Botryodiploidia theobromae* Patr. have been reported. This can quickly

Fig. 15.3. Wilt of plants in litchi

kill the trees and no satisfactory control method has been established. A species of *Fusarium* has been isolated which is associated with the sudden death of the plant. One side of the tree's crown may be perfectly sound and the other totally necrosed. Leaf shed never occurs (it does in the case of a nematode attack) and the internal parts of the roots are characteristically red in colour. As with the previously mentioned cases, no control method has been reported. No method has been found to save the tree once it has become infected.

Management

- Growers are recommended to remove all roots from other host trees before planting litchis. Set up a drainage system prior to planting the litchi to ensure that there is no standing water around the base of the trees.
- Prune the tree to reduce evaporation and encourage root growth to help the tree to recover quickly.
- Add organic manure to improve the biological resilience of the soil.
- Do not propagate trees from cuttings in soil from diseased areas.

4. Red Rust

It is a parasitic algae, which occasionally attacks trees causing loss of vigour. The alga starts its appearance as small dark isolated patches which spread very fast and ultimately develop into a velvet reddish brown to orange coloured cushion like growth (Fig. 15.4). Algal filaments associated with both asexual and sexual reproductive organs, grown on both the surfaces of leaves and penetrate deep between cuticle and epidermis and sometimes extend between adjacent epidermal cells into the layer of parenchyma below epidermis. The growth of this alga initiates the development of cork tissue in few upper layers of leaves, thus causing their death. Severely infected leaves exhibit curling inward towards dorsal side. The disease first appears on the young unfolded tender branches. On the infected young leaves, small lesions of velvety white growth appear on the lower surface. On the upper surface, just the opposite site of the lesion, chlorotic patches occur. As the leaves unfold and increase in size, the velvety growth becomes more prominent and dense. Later, larger areas of leaves are affected with this growth. Old and thick leaves show various types of malformation. The velvety growth turns light brown to brick-red.

Fig. 15.4: Red rust

Control

- Foliar application of copper oxychloride @0.3 per cent should be done in the month of July and October.
- The spray of 5:5:50 Bordeaux mixture during autumn (September-October) and Spring (February-March) at 15 days interval depending upon degree of infestation.
- Spray of 0.25% ziram also reduces the disease.

5. Fruit Rot

Fruit rot of litchi has been a serious problem. Litchi is host to a range of post-harvest pathogens, often with quite different modes of infection. Several fungi have been found to be associated as reported by several workers. Usually large water soaked lesions appear on the surface of fruits. Initially the disease symptoms are perceptible on injured portion of the fruits. With the advance of the disease the decayed areas get depressed. The rot gradually penetrates deep into the pulp. Ultimately rind of infected fruits cracks off exposing the pulp which subsequently is covered with thick cottony mycelium. Such affected fruits emit an odour of fermentation.

Management

- Low temperature storage is the most successful means of slowing rot development. For instance, fruit stored at 22°C rotted three times more quickly than fruit stored at 5°C.
- Fungicides are also effective. Hot benomyl dips at 48° to 52°C slow rot development compared with undipped fruit. Rots still affect the dipped fruit, although the fungicide slows the spread of the diseases. This technology has not been used due to health concerns surrounding fungicides.