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Diseases of Coffee during mansoon season and their management

Coffee is a perennial plantation crop belongs to the family Rubiaceae and the genus *Coffea*. Arabica (*Coffea arabica* L.) and robusta (*Coffea canephora* Pierre Ex. Froehner) are the two species of *Coffea* which are cultivated on a commercial scale in all the coffee growing countries. In India, coffee is cultivated mainly in the hilly tracts of Western and Eastern Ghats under agro-forestry ecosystem. The final produce of coffee is consumed as a non-alcoholic beverage worldwide. This agro-based industry generates foreign revenue to most of the producing countries besides providing livelihood to millions of people involved in the coffee production chain.

The coffee plantations in South India, experience the prolonged wet weather of South -West monsoon from June to September and invariably suffer from fungal diseases such as black rot, soft rot and stalk rot which has prominent impact on crop yield and quality. Therefore, it is important for the coffee growers to aware of the damage caused by these diseases and to identify them properly in the initial stage itself to take appropriate measures so as to prevent the crop loss and to keep the plants healthy.

1. Black rot disease

Black rot disease in coffee is caused by the fungus *Koleroga noxia* Donk. and is considered to be the second important disease of coffee next to leaf rust. The pathogen attacks both the commercially cultivated species of coffee. It is an endemic disease, mostly found in those areas which come under the influence of South-West monsoon which receives annual rain fall above 80 inches. This disease is generally noticed in the valley areas of the plantations. In India, this disease has been reported from almost all coffee growing regions of Karnataka, Kerala and Tamil Nadu coming under the influence of heavy South-West monsoon rains.

Symptoms

The black rot disease fungus infects leaves, developing berries and tender shoots. The most striking symptoms are blackening and rotting of the infected leaves, developing berries and young twigs. At an advanced state of infection, the affected leaves get detached from branches and hang down by means of slimy fungal strands (Fig.1). On green berries the characteristic blackening starts from one side and spreads gradually in a narrow band (Fig.2). Close examination reveals the presence of characteristic white mycelial strands running along the twig, petioles and spreading mostly on the lower surface of the leaves (Fig.3). Affected leaves and berries show a white web consisting of closely interwoven mycelia when surface moisture is drained. Defoliation and berry drop from the infected branches occur in advanced stage of disease.

Nature of damage

Damage caused by this disease varies from place to place and season to season. However, in severely diseased areas, a loss of 10-20% of the crop for the whole estate and 70-80% or even more on an individual bush has been recorded. Further, indirect crop loss due to foliage loss by the disease which leads to severe die-back and destruction of wood may also be taken into account while estimating the crop loss.

Fig. 1. Severely infected leaves hanging on branches by means of slimy mycelial strands

Fig. 2. Rotting of infected berries

Fig. 3. White mycelial strands running all along the twig and spreading on the lower surface of the leaves

Favourable factors

The disease development is favored by continuous monsoon without a long dry spell, saturated atmosphere with 95-100% relative humidity, thick overhead shade, sheltered from sunlight and wind in valleys and frequent or continuous mist during the monsoon.

Preventive measures

- Thinning of overhead shade in endemic blocks, before the onset of South-West monsoon will reduce the black rot incidence.
- Avoid monoculture shade trees of Silver oak in the disease-prone areas, as the leaf fall covers the entire coffee canopy which is conducive for the disease incidence.
- Remove crisscross branches and tender shoots from the centre, as well as dead and dry branches, suckers and fallen leaves of shade trees from the canopy of bushes.
- Avoid closer planting and over crowding of robusta bushes in black rot endemic areas.

Management

- As a prophylactic measure, spray 1% Bordeaux mixture on both surface of leaves and also on developing berries before onset of South-West monsoon.
- If incidence is noticed during rainy season, spray carbendazim 50 WP @ 120 g in 200 liters of water along with any one of the wetting agent during the clear break in monsoon.

2. Stalk rot of berries and leaves

Stalk rot is another important disease observed during monsoon both on arabica and robusta coffee. The disease is caused by the fungus *Colletotrichum gloeosporioides*. The fungus develops as a white cottony mass at the stalk region causing disintegration of tissues leading to pre-mature drop of developing berries.

Fig.4. Stalks showing white cottony mass of the fungus which are devoid of berries

Symptoms

Brown to black necrotic lesions appears on the nodes and internodes of the green wood branches towards apex. White cottony mass of the fungus develops at the stalk region (Fig. 4), developing berries and leaves drop down due to necrosis and decay of the stalk portion. Generally, the rotting stalk remains on the branch while berries are dropped. One or two nodes at the tip of the infected branches may show total berry drop. Infected tender twigs die from the site of infection.

Nature of damage

Brown to black necrotic lesions appears on the nodes and internodes of the green wood of the branches towards the apex. Stalk portion of the berries and leaves also show necrotic spots and then starts decaying leading to defoliation and berry drop. Generally, the rotten stalk remains on the branch while berries drop prematurely.

In general, premature berry drop occur between 90-120 days after the blossom to an extent of 8-10% under normal conditions and up to 10-40% during severe adverse weather conditions. It is an established fact that out of the set fruits, only about 60% will be retained on the arabica plants till maturity and ripening. The berry drop during monsoon period is generally considered as a Physio-Pathological complex due to reasons of excess soil moisture coupled with fungal attacks.

Favourable factors

Low temperature, high relative humidity, surface wetness of plants, excess soil moisture favours the disease development.

Preventive measures

- Take up proper bush management before onset of monsoon to prevent the disease.
- Provide good drainage system and clean the cradle pits before monsoon to remove stagnation of water around root zone.
- The mulch below the canopy should be removed and heaped in centre of four plants to provide better aeration.
- Apply balanced nutrient (NPK) to the plants from where high crop was harvested in the previous year.
- Take up pre-monsoon spray of Bordeaux mixture (0.5%) to foliage, branches and developing berries in the month of May/June.

Management

- Spray carbendazim 50 WP @ 120 g in 200 liters of water along with any one of the wetting agent during clear break of monsoon in endemic areas.

Fig.5. Rotting of berries with fruit bodies of fungus

3. Soft rot disease

This disease is observed on arabica coffee and is caused by the fungus *Sclerotium rolfsii*. The fungus affects the leaves, developing berries and tender branches.

Symptoms and nature of damage

The disease appears as water soaked lesions on leaves and berries leading to softening and decaying of infected tissues (Fig. 5). The affected branches, leaves and berries rot and white mycelial growth of the fungus could be observed. Mustard like sclerotial bodies of the fungus is seen in the advanced stage of infection.

Favourable factors

Continuous rain, high relative humidity, thick overhead shade in the plantation favours disease development.

Preventive measures

- Thinning of overhead shade before onset of South-West monsoon will reduce the disease incidence.
- Proper bush management such as centering, handling, removing criss-cross branches, tender shoots from centre of the main stem, dead and dry branches will minimize the disease.

Management

- As a prophylactic measure, spray 1% Bordeaux mixture on both surface of leaves and also on developing berries before onset of South-West monsoon.
- If incidence is noticed during rainy season, spray chlorothalonil 75 WP at @ 800 g in 200 liters of water along with any one of the wetting agent during clear break in monsoon to the infected plants or blocks.