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PROTECTION OF TEA FROM RED ROOT DISEASE

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1. Introduction

'Red root disease', more commonly known as 'Poria root disease' of tea, is caused by a fungus (*Poria hypolateritia*). This occurs most frequently in tea growing areas over 600 m (2000 ft) in elevation. The disease can appear on solitary bushes or in patches. It usually spreads by means of mycelial strands (fungal threads), which is able to grow through the soil. Therefore, root contact is not essential for the spread of infection.

2. Symptoms and Diagnosis

Proper diagnosis of the disease in the field is of fundamental importance in its control. The first symptoms are yellowing of the foliage, followed by wilting and the sudden death of a part or the entire bush with the withered leaves remaining attached for several days.

The affected bush must be uprooted with the roots. If the infection is fresh and active the fungal mycelium could be seen as whitish specs on a reddish background, particularly towards the base of the bush. If the infection has been there for some time, these symptoms can be seen only after scraping the root-surface-soil-layers with a knife. The mycelium is initially white, soft and fluffy but turn into smooth, thin, flat, dark red cords or sheets, with age. These dark cords are normally inconspicuous. However, when such roots with old infections are soaked in water, the red cords of the mycelium can be recognised. When the disease is at an advanced stage the roots become soft and pulpy, making it difficult to extract from the soil.

3. Disease Control

3.1 Cleaning of Infestation

3.1.1 Small Infected Patches

If only one or a few plants are infected, remove the dead or dying bushes and any adjoining ones that are showing any yellowing of the foliage. Any stumps or trees found within the infested patch must also be uprooted. The patch should be deep-forked (30-45 cm) and all living and dead roots of more than pencil thickness should be collected into one pile. All the bushes and any woody material uprooted in the cleaning process must be burnt on the spot if the space is adequate. This is to prevent any possible dissemination of infected material into uninfected areas. Only when that is not possible, the closest possible alternative spot must be chosen for burning them.

3.1.2 Large/Several-Infected Patches

A large area may be infected by the disease as one contiguous block or as several small patches of several bushes adjacent to each other. The method of cleaning is essentially similar to that described for cleaning of small patches. If the infected area is staggered and includes several small pockets close to each other, it would be advisable to demarcate the entire area to include all of them into one block.

Remove all the bushes and stumps within the demarcated area, with their roots. The patch should be deeply forked (45-60 cm) and all the remaining roots larger than pencil-thickness be collected and burnt *in situ*.

If there are many large patches, do not attempt to clean all of them at once. List the bad sections and treat them first to prevent fast spread and contamination. The entire cleaning and burning operation needs very close supervision, preferably of the Superintendent or his Assistant.

3.2 Treatment of Peripheral Bushes

After the infected area has been thoroughly cleaned, the two rows of bushes surrounding the patch should be treated with a soil drench directed at the area around the collar of bushes using a suitable fungicide (see below) at 300-350 ml per bush. They should be applied when the soil is suitably moist. Repeated applications at 2-3 month intervals up to 3-4 times must be undertaken depending on the performance of peripheral bushes. Care should be taken to avoid surface run off at the time of drenching treatment. It would be advantageous to loosen the soil around the plants with a hand fork before treatment with one of the following fungicides.

Bitertanol - Baycor 300 EC	- 0.3% (30 ml in 10 l of water)
Hexaconazole - Contaf 5EC	- 0.2% (20 ml in 10 l of water)
Propiconazole - Tilt 250 EC	- 0.2% (20 ml in 10 l of water)
Tebuconazole - Folicur 250 EW	- 0.2% (20 ml in 10 l of water)
Tridemorph - Calixin 750 EC	- 0.2% (20 ml in 10 l of water)

If for some reason, any of the peripheral bushes develop symptoms of the disease they should be uprooted immediately, taking all the precautions mentioned above and the adjoining bushes be treated with a fungicide as before. This process of observation and uprooting should continue until no more symptoms appear and the disease is not spreading any more.

3.3 Planting of Grass

When the cleaning up operation is over, the patch should be planted with a suitable grass, for a minimum period of two years before planting tea. Mana is preferred if the patches are small.

3.4 Treatment of Infills

At the end of rehabilitation period, the patch could be planted with tea immediately followed by drenching fungicide treatment. The rate of application in the first two rounds (at 2-3 month intervals) can be at the rate of 250 ml per plant which should be increased up to 300 - 350 ml per plant in the subsequent two rounds, using one of the following fungicide solutions at the concentrations indicated against them.

Bitertanol - Baycor 300 EC	- 0.2% (20 ml in 10 l of water)
Hexaconazole - Contaf 5EC	- 0.1% (10 ml in 10 l of water)
Propiconazole - Tilt 250 EC	- 0.1% (10 ml in 10 l of water)
Tebuconazole - Folicur 250 EW	- 0.1% (10 ml in 10 l of water)
Tridemorph - Calixin 750 EC	- 0.1% (10 ml in 10 l of water)

Cleaning of Poria patches should be started two years prior to pruning, so that the vacancies can be infilled in the pruning year.

3.5 Treatment of areas to be replanted

In areas earmarked for uprooting for the purpose of replanting tea, the cause of death or of any dying bushes should be properly identified. Any areas suspected and or confirmed to be affected by poria, must be demarcated and cleaned first taking all the precautions mentioned for containing the disease. It is best that these areas are marked out for future identification so that the necessary follow up treatments (as indicated before) can be properly undertaken after planting of tea.

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