

Advisory Circular No. 2019/02

# Management of White Root Disease



**Rubber Research Institute  
of Sri Lanka**

# **MANAGEMENT OF THE WHITE ROOT DISEASE IN RUBBER PLANTATIONS**

## **The disease**

The white root disease caused by *Rigidoporus microporus* (Fr.) Overeem is the most destructive root disease in rubber plantations. Immature rubber plants can be infected as a result of root contact with infected stumps or root debris of the previous rubber plantation, while mature trees are infected due to root contact with infected roots of adjoining trees. The disease is common in wet areas of Sri Lanka and the fungus infects a wide range of trees including tea, coffee, cocoa, jak, *alastonia cinnamon etc.*

## **Symptoms**

The symptoms on leaves of infected rubber trees develop as slightly off-green discolouration, loosing glossy appearance which eventually turns to yellowish. Mature leaves thereafter become leathery and curve downward and buckled. At latter stages, leaves become orange-brownish and fall off causing die-back of the affected tree. However, in some clones such as RRIC100, instead of yellowing, leaves may suddenly turn to reddish-brown. In some cases, infected trees flowers premature or during the off-season eventually producing pods before the die-back. However, irregular flowering of some clones may confuse the disease identification.

The infection on roots and the collar region of an infected tree can be seen as thick white strands of mycelia which on ageing turn to beige or cream colour. The wood of infected roots can be seen as cream coloured and soft, as the lignin has been digested by the fungus. The bark underneath the infected area of the collar region becomes reddish-brown when tissues are dead. During the advanced stage of the disease, fructifications develop in abundance at the ground level of the trunk. They are semi-circular brackets, concentrically zoned and grown at horizontally from the collar area or from exposed infected roots. When fresh, the upper surface is yellowish orange with a pale yellow margin, and the lower surface is light orange having tiny pores.

## **Management practices for controlling the disease**

### ***Precautions to be taken during uprooting the old stand and land preparation***

1. Before uprooting, demarcate all the infected patches encompassing 3-4 apparently healthy adjoining trees using natural boundaries such as rocks by marking on them or using concrete poles.
2. Remove all infected roots from demarcated risky areas as much as practicable, particularly from the trees bordering the patch and remove them from the field.
3. Do not cut large laterals to facilitate uprooting trees. Never roll infected stumps to lower slopes, as it introduces the pathogen to areas hitherto free of the disease.

### ***Precautions to be taken during replanting***

1. Change the planting points and the inter-row distance between replanting cycles. This helps to reduce the incidence of the disease, as it would take a longer time for roots of new plants to contact the old infected roots, if any.
2. Establish a cover crop such as *Pueraria phaseoloides* as it helps in the rapid decay of remaining roots, dissipates inoculum, encourages the growth of saprophytic organisms and exhausts the food reserves of potentially dangerous inoculum. In WRD risky areas, never establish the cover crop *Mucuna* as this cover crop too gets infected by *R. microporus* and it could harbour a heavy inoculum in its deep and extensive root system.
3. When replanting in a demarcated risky area, mix about 125 g of sulphur into the soil around the plant leaving a gap of a 15 cm from the base of the plant, since, sulphur can scorch tender roots, resulting in death of plants. It would be appropriate if sulphur is added to the planting hole about 1-2 months prior to replanting.
4. Keep the cover well away from the base of rubber plants.

### ***Precautions to be taken after planting***

1. Rubber plants established within previously infected risky areas should be inspected frequently by exposing roots and observing foliar symptoms.
2. A fungicide should be applied immediately for infected plants. Infected plants having more than 50% of dead collar should be uprooted and remove the infected debris including the source of infection. For no reason, the infected logs or root debris should be left in the field, since, the cover crop and the adjoining healthy trees can also be infected in contact with such debris. Thereafter, amend about 200 g of sulphur to the vacant hole and mix with soil. Only after 2 months, a new plant can be established at the same point.

### ***Disease control by applying fungicides***

The white root disease can be managed by applying a systemic fungicide if detected before the leaf symptoms are visible. By regular inspection of collars of plants in the risky area, the infections can be identified at very early stage enabling the chemical control.

Infected trees having more than 25% healthy collars can be recovered by applying a systemic fungicide. Fungicides should be applied during early morning exception rainy days. The soil around the collar area should also be removed to facilitate the absorption. Systemic fungicides tebuconazole and hexaconazole are recommended to control the disease.

Since most of pesticides are toxic, it is always advisable to wear protective clothing, gloves and a mask of good quality when applying them. It is not advisable to consume any foods during the application of fungicides.

### ***Fungicide application for young infected plants***

1. tebuconazole 250 EC  
Prepare 0.25% *a.i.* solution from the tebuconazole  
eg. tebuconazole 250 EC  
Age 0-1 yrs – Dissolve 10 ml of the fungicide in 1 litre of water  
Age 1-2 yrs – Dissolve 20 ml of the fungicide in 2 litre of water  
Age 2-3 yrs – Dissolve 30 ml of the fungicide in 3 litre of water  
Ages above 3 yrs - Dissolve 40 ml of the fungicide in 4 litre of water

2. hexaconazole 50g/litre  
Age 0-1 yrs – Dissolve 50 ml of the fungicide in 1 litre of water  
Age 1-2 yrs – Dissolve 100 ml of the fungicide in 2 litres of water  
Age 2-3 yrs – Dissolve 150 ml of the fungicide in 3 litres of water  
Ages above 3 yrs - Dissolve 200 ml of the fungicide in 4 litres of water

Drench the above fungicide solutions around the base of the trees including all the surrounding trees.

Inspect all treated plants quarterly or at least once a month in wet periods for re-infections. Repeat the fungicide application if necessary after 3 months. Any dead or severely infected plants including all infected root debris should be removed and supplied with new plants. It is always important to tag treated plants including the date.

### ***Fungicide application for mature infected trees***

Apply four litters of the fungicide solution prepared as given above on the collar region of an infected tree. Similarly, treat the adjoining trees to protect them from possible infections through root contacts. Prior to the application, scraping-off the thick cork layer around the base of the trunk may facilitate the absorption of the fungicide.

Inspect all the treated trees quarterly or at least once a month in wet periods for re-infections. Repeat the fungicide application if necessary after 3 months. Remove severely infected or dead trees along with all infected roots and add about 200 g of sulphur in to the soil in uprooted holes. Vacant points should also be treated similarly with sulphur to suppress the pathogen living on remaining sources of infection.

It is advisable to check the existence of the pathogen in vacant points by placing few *Gliricidia* poles in the vacant hole and around. After 1-2 months, poles should be removed and check for infections on them. If poles are infected, sulphur application should be repeated.

***Do not neglect the white root disease. Act promptly and protect your rubber trees from this deadly disease!***

***For any assistance please contact the Department of Plant Pathology & Microbiology of the Rubber Research Institute.***

***KEEP WHITE ROOT DISEASE AWAY FROM RUBBER PLANTATIONS!***

## *Cover story*

- a-b. Canopy showing buckling on a severely infected tree.
- c. Mycelial rhizomorphs of *Rigidoporus micropous* on an infected root.
- d. Fructifications on dead rubber tree.
- e. Drenching a systemic fungicide on the infected collar.

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