Bulletin of the Rubber Research Institute of Sri Lanka, (2004) **45,** 51-54

ROLE OF PLANTATION COMPANIES ON MANAGING WHITE ROOT DISEASE

K E Jayasuriya, E B Fernando and P Pieris

White root disease caused by *Rigidoporus microporus* (Fr.) Overeem, is the most threatening root disease of rubber in Sri Lanka. The pathogen is a soil-borne fungus and it affects both mature and immature clearings, killing the trees and subsequently spreading towards the adjoining healthy trees as well. The pathogen initially colonises the collar region of young or mature trees causing disturbances to the function of xylem tissues, producing yellowing and wilting symptoms in the canopy. In latter stages, tissues of the entire collar region colonise by the fungus, resulting in tree death.

As other micro-organisms, the white root disease causing pathogen also prefers soils rich in nutrients such as organic matter from litter substances and adequate oxygen concentrations. Therefore, compact soils are not preferable for the pathogen. However, top soil up to 20 cm depth may be suitable for the pathogen since enough gases are present. As organic matter usually enhance the growth of the fungus through soil as mycelial threads, having a thick layer of organic matter under the cover crop surrounding infected plants may enhance the growth of the fungus to adjoining healthy plants through soil. Therefore, immature fields should be properly managed if the disease is there. Wet weather may also enhance the fungal growth through soil and this will lead to an extensive spread. In wet soils, the fungus thrives well and produces luxurious mycelial mats on the infected roots resulting the quick death of the infected plant. Usually, in flat rubber lands, the white root disease is easily transmitted to adjoining trees. However, in sloppy terrains the disease may be transmitted to the adjoining trees on the same platform and to trees on the lower platform.

From a brief survey carried out recently, it was noted that, in flat rubber plantations, from a single white root disease infected plant, approximately 55 – 80 trees may be destroyed during a period of 15 years. This figure can increase even up to 80- 135 trees depending on the location of the first infected plant or the initial number of infected plants. In a 20-30° sloppy rubber land, the actual spread from a single infected plant has been noted approximately as 20 trees during a period of 15 years. However, in this case, the highest potential of this number would be 30 trees depending on the location of the first infected plant or on the initial number of infected plants. From these survey results, it may be possible for the growers to realize the potential threat from this disease to the economy of the industry. Unfortunately, during the recent past, the white rood disease incidence in rubber lands

in Sri Lanka has increased dramatically, causing heavy tree losses lowering the plant density and leaving unproductive patches of lands.

Due to the severe drop of natural rubber prices in the international market during the latter part of the 1990s up to the year 2002, the income generation from rubber plantations in Sri Lanka has been seriously affected. This situation became worst, when plantation companies decided to not to replant rubber during the period of 1999-2001 due to low financial benefits from rubber. Their main objective during the particular period was to exploit the plantations for maximum latex yields. As a result, the plantations were not maintained according to the RRISL recommendation during this critical period, resulting in negligence of important aspects such as disease control, particularly with respect to the white root disease.

As a result of the privatization of the state-owned rubber plantations, it appears that regular field visits and observations are being neglected due to the restriction of the field staff. It is important to employ the adequate number of field officers who are motivated to be responsible for following all required cultural practices. The growers should have a sound knowledge on the biology of the disease and factors affecting the disease incidence. Our recent observations have revealed that most of the plantation companies recruit young officers without having biological knowledge for managing fields. The reason behind this may be to scavenge for the maximum economical benefits from the plantation. However, it is important for growers to realise that the rubber plantation should be well looked-after in order to obtain maximum benefits. Plant requirements should be met with great care at the correct time with correct amounts. New recruits should be adequately trained on identification of diseases, and provide them all the facilities to tackle such problems. Identification of the white root disease at the initial stage is very important in order to provide necessary treatment to suppress further spread. Therefore, having a recommended fungicide readily available is a must, and the field staff should be in a position to take immediate action to treat infected plants.

In many incidences, it has been noticed, that heavily infected mature trees have been felled off at the ground level leaving the infected log in the field, which is not correct. As a result, the disease causing pathogen may remain viable on logs, laterals and tap roots for a period up to 2-3 years. After a few months time, some adjoining healthy plants also become infected, and when replanted on the same area, the pathogen in underlying logs will infect the new plants too. For most of the companies, which are running tea factories in their own, finding adequate fire wood (approximately 15-20 yards per day) may be a problem. Therefore, the management tend to fell and cut rubber trees to fulfil the requirement of the tea factory, the income from which is more attractive. To get the above task done, some companies employ permanent tree fellers on contract, the duty of whom is to fell off and cut the required number of trees from old clearings or from a white root disease infected patch of an old clearing. Disregarding the recommended practices, they usually cut the trunks and leave the logs behind without uprooting. This practice followed in any type of

clearing will lead to a major problem if the logs were infected by the white root disease which can result in a large infected area.

The other reason for neglecting white root disease incidence is the lack of adequately trained supervisory field staff personnel in estates, who are capable of identifying the disease at early stages and provide necessary treatments. Moreover, the existing field-staff also tend to be transferred to other divisions at any time, voiding their responsibilities to their divisions. Usually in such instances, the new field staff can be unaware of the history of their new fields, and they always tend to seek excuses for present disease incidences passing the blame to the previous field staff. This should not be allowed to continue. It is the responsibility of the estate managerial staff to look into such incidences to avoid any losses.

Some plantation companies are reluctant to follow recommended agricultural practices in rubber lands, which may be due to lack of awareness of the importance of cultivating rubber according to scientific recommendations. When planting, their prime interest may be planting rubber plants in holes on the basis of covering targets to obtain the maximum labour output. Planting holes may be dug using modern machineries and such holes may not be up to the recommended dimensions. Planting and filling with soil may also be done solely on a target basis, resulting in poor plantation with weak root system. Such bad practices are not allowed in any cultivated crop, and especially when rubber is planted in white root disease risky area. The field workers may fill planting holes with soil containing pathogen inocula, which may have accidentally unearthed when digging holes, and this will lead to infections of new plants too. Proper supervision of planting process therefore, is great importance.

In some estates, trees from old plantations remain in between, which may cause spreading the white root disease very quickly as they can serve as disease transmitters. In some instances "Kenda" (*Macaranga peltata*) or other tree bushes can also be vectors or transmitters of white root disease if they are present in nearby fields. As such, white root disease incidence in rubber lands, which are intercropped with tea or other tree-crop, should be managed soon after the detection, since it may be transmitted to a larger area through dense root network of two crops. The damage to rubber trees can be extensively high as tea bushes withstand white root disease infection until late without showing symptoms. It will be better to uproot rubber trees and tea bushes which are irrecoverable rather than keeping them for obtaining yield. If this is not done in time, it will be more difficult and expensive to get rid of them later.

Having white root disease infected trees in mature clearings is another common incidence in many rubber estates. This should not be taken as an excuse for cutting infected trees for other purposes such as for fire wood. Every attempt should be taken to recover the infection at a minimum cost. Therefore, large infected trees should be supported and the root system should be treated with a recommended fungicide and remove the food base if available or find the adjoining infected trees which should also be treated similarly. To find the source of infection of any tree,

root system should be excavated and examined for the direction of the fungus reached from. It is very unlikely that a rubber tree of more than 5 years of age be infected from the depth of the tap root, and it should always be from a lateral root which is in contact with another root of an adjoining tree. The treatment to a large infected tree may not be successful if the infection has damaged the whole collar area nearly rim-barking the tree. In such instances, it may be worthwhile to uproot the entire tree without leaving any roots underground and remove the whole log from the ground. As this process requires close supervision, the field staff should understand the importance of the above steps of the whole procedure. Generally, it should be the responsibility of the field staff to treat the first single infected plants rather than leaving room for treatment of more plants later, due to negligence.

The recommended method of uprooting of infected mature clearings for replanting is highly labour intensive as all the infected logs including roots up to pencil thickness should be removed from the field. The success of the task depends on correct supervision. The soil erosion after a rainy spell is very high due to the disturbance to the top soil. It is extremely important to encourage the growers to follow the recommended management practices to combat the white root disease. To achieve this, an introduction of easy-to-follow recommendations which are less labour intensive, is important.

In immature plantations, the white root disease can easily be controlled by drenching an effective systemic fungicide such as hexaconazole. However, the success rate would depend on the severity of the infection and the age of trees. In some cases it may be necessary to treat a single tree for two occasions with a three-month interval if the first treatment would fail to control the disease. To detect the failure, the young trees should be observed carefully for a period of 3-4 months with great care by continuously inspecting the root system and the collar. When treatments are unsuccessful, such trees tend to die. In such instances, the dead tree and the log should be removed with care, not leaving infected lateral roots behind.

Eradication of the white root disease from a mature clearing is relatively difficult and expensive if not supervised closely. Therefore, novel methods to eradicate the pathogen from disease infected mature tree patches, which may be less labour intensive are being tested. In one such method, eradication of the pathogen from soil has been proposed as single or combined treatments, which preserve the soil from erosion, whilst increasing the soil fertility. Despite of constrains in managing the rubber industry, the time has come to join hands and workout an effective way of making rubber industry a sustainable source of income to the country.