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ROOT DISEASES OF TEA

P.V. Arulpragasam

(Actg. Head, Plant Pathology Division, Tea Research Institute of Sri Lanka, Talawakele, Sri Lanka)

INTRODUCTION

The four common root diseases of tea in Sri Lanka are Red root disease *(Poria hypolateritia)*, Black root disease *(Rosellinia arcuata)*, Charcoal root disease *(Ustulina duesta)* and Brown root disease *(Fomes noxius)*. Of these, Red root disease or *Poria*, as it is commonly called, is the most serious and of major economic importance. But in recent times, there has been an alarming increase in the incidence of Brown root disease being reported from a number of estates in almost all the planting districts (Arulpragasam, 1986, 1987). In most cases it has been found to be associated with debilitated bushes and with the felling of shade trees.

Unlike other diseases, the effects of root diseases are not immediately visible and their presence on an estate is not detected until the death of the bushes that are affected. By that time it is too late. Therefore, attention must be focussed on preventing the spread of the root diseases once detected. For, the death of the bushes not only cause a loss of capital but also a loss in revenue, since it would take a long time before the bushes that are lost are replaced and come into production.

Symptoms of root diseases

The above ground symptoms of all root diseases are similar. The symptoms are always of water shortage, but they can occur at times when the soil is not deficient of water as well. If a bush suddenly dries up as though it has been scorched and dies with all its leaves intact, then it is almost certainly a case of root disease. The leaves often turn coppery brown and stay attached to the branches for a few days before they

fall off. In some cases, as in the case of Brown root disease, the leaves may fall gradually for several months until the branches bear only a few leaves at the tips and the bushes may remain in this condition for a long time before they finally die.

If after the fall of leaves, new shoots are produced on the branches then the possibility of a root disease can be ruled out. Further, if the branches die and new shoots are produced at the collar, then the cause of death is in the stem and not in the root system.

To identify the root disease, the bushes should be dug up and the roots examined carefully. The characteristic symptoms of the various root diseases of tea have been described and illustrated in the Handbook on Tea (1986), published by the Tea Research Institute of Sri Lanka. Further details could be obtained from the publications of Petch (1923), Gadd (1949) and Shanmuganathan (1967).

Control of root diseases

Areas affected by root diseases should be first demarcated and isolated and then they must be cleaned thoroughly and treated. Dead or dying bushes in an affected patch should be uprooted and their roots examined for the cause of death. The affected bushes along with a ring of healthy bushes surrounding them, should be dug out completely and their roots examined. If they are found to be infected, another ring of healthy bushes should be uprooted till two rings of healthy bushes have been uprooted at every point in the perimeter of the affected patch. If a number of bushes have died in several small patches close to each other, it would be convenient to demarcate the entire area by straight lines so as to include all patches within the rectangle or square thus formed. Similarly a large irregular patch could be straightened out in a similar manner. The area so demarcated and isolated should include two rows of healthy bushes at every point in the perimeter.

All the bushes in the demarcated area should be uprooted and any stumps of trees within the patch also must be removed. All bushes and woody material uprooted during the cleaning operation should be burnt on the spot. The patch should be forked deeply and all roots, living or dead, of tea or shade trees, of more than pencil thickness should be carefully collected and burnt. It is important that no woody material, which might serve as a food base for the fungi, be left in the soil. In the case of Black root disease (*Rosellinia*), it is important that the leaf litter in the affected area be raked and burnt with the other infected material.

The cleaned area should be put under grass for a minimum period of two years before infilling. For any method of root disease control it is important that all infected roots above pencil thickness be removed by forking. Uprooting the bushes with a winch will ensure that all large roots are removed without damage. Rehabilitating with grass for a period of two years serves a double purpose. Firstly, the small roots left in the soil at the time of uprooting the tea will disintegrate during this period of two years and without any food source or alternate host the fungus will be unable to survive. Secondly, rehabilitation will improve the physical structure of the soil and its organic matter content and hence the infilled plants will grow better.

Except in the case of *Poria* root disease, tea can be planted after the two years rehabilitation period. In the case of *Poria* which does not need root contact to spread from bush to bush and which can spread through the soil two methods of control are now available. One is that of fumigation with methyl bromide (Shanmuganathan, 1965). Here the *Poria* patches are fumigated after cleaning up and are rehabilitated with grass for two years before tea is planted. The second method, which is very much less expensive, involves the rehabilitation of *Poria* patches, cleaned in the usual manner, for a period of two years, without fumigation.

At the end of this period tea is planted as usual, but is watered periodically with certain systemic fungicides for a period of 9-12 months after planting (Arulpragasam, Addaikan and Kulatunga, 1987).

Control of root diseases in areas to be replanted

In areas that are to be replanted it is important that the diseased areas be first identified and treated as described above, before the rest of the area is uprooted. Since it is necessary to treat the *Poria* infected patches differently it is important to identify the cause of death at the time of uprooting so that the appropriate control measures could be adopted.

Control of root diseases in areas to be infilled

The diseased patches should be cleaned as described and put under grass for a minimum period of two years and thereafter infilled in the pruning year. Cleaning operations could be started, in the fields due for pruning in two years time, so that the cleaned patches would have been under grass for a period of two years before they are infilled in the year of pruning.

However, if resources permit, it would be advisable to clean any diseased patches as soon as they are detected and put them under grass till the time of pruning of that field. This measure will help to prevent the spread of the disease.

In uprooting diseased patches, if it is found that about 30-40 % of the bushes are affected in a particular area, it would be better to uproot the whole area and treat it as a block, rather than treat them in small patches.

Prevention of the spread of root diseases

The first step is to remove all dead or dying bushes as soon as they are detected, with all their roots and burn them on the spot, irrespective of the cause of death. Under no circumstances should the stumps be left in the ground with only the branches removed. Any jungle or shade tree stump in the diseased patch must also be dug up and burnt, and its lateral roots should be traced and pulled out as far as possible. No roots living or dead and no woody material which might become a food base should be left in the soil.

In order to prevent the spread of root diseases, it is not sufficient to remove the visibly affected bush, because, by the time it is detected, adjacent bushes, though not showing any symptoms, may have already been infected. It is advisable, therefore, to remove healthy looking bushes surrounding the infected patches for examination until two rows of healthy bushes have been removed.

One of the most common methods of spread of root diseases is by the dispersal of infected material. Labourers should not be allowed to remove the infected material for firewood. It is important that all material recovered from a diseased patch be burned on the spot.

Another method of spread of root diseases is by spores. When the spores come to rest on unprotected prune cuts of tea or on shade tree stumps, they can cause infection. Brown root disease and Charcoal root disease have been found to spread in this manner, whereas *Poria* and *Rosellinia* rarely originate on prune cuts or tree stumps. Therefore, to prevent the spread of these diseases in this manner it would be necessary to protect the prune cuts and shade tree stumps with some kind of wound dressing.

It is well known that the felling of shade trees enhance the incidence of root diseases in tea. Killing of shade trees by ring-barking prior to felling has been found to reduce appreciably the incidence of root diseases. The object of ring-barking is to exhaust or substantially deplete the root reserves so that when the tree is cut down its roots will have little or no food reserves for the parasitic root fungi, whilst at the same time saprophytic fungi would have invaded these depleted roots and would thrive to the detriment of the parasitic fungi. In addition the stumps could be cut just below ground level and covered with soil so that the possibility of root diseases originating at the stumps will be greatly diminished.

CONCLUSION

Root diseases have become a serious problem on many estates and in view of the nature of the damage that they could cause, a concerted programme for their control should be undertaken without delay.

Large extents of many estates have been affected by root diseases and it is time that additional funds are allocated separately for the control of root diseases. Root disease control involves the large scale uprooting of tea and this would be facilitated and speeded up by the use of winches, which will not only speed up the cleaning operation but also remove the larger roots without breakage and would be economical in the long run. It would also be necessary and advantageous to have trained gangs of workers to identify and treat diseased patches.

Loss of crop caused by root diseases is no doubt one of the limiting factors in crop production in Sri Lanka today. In the interests of our tea industry estates should speedily implement a programme of root disease control on their estates.

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