

STEM CANKER CAUSED BY *MACROPHOMA* *THEICOLA* PETCH IN THE LOW COUNTRY

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This disease, caused by the fungus *Macrophoma theicola* Petch, is the commonest stem disease of tea grown at low elevations in Sri Lanka. It causes branch canker or kills the young shoots and in severe attacks may kill the entire bush by girdling the main stem. In recent years there has been an increase in the incidence of the disease, and it has been observed to kill young plants in new clearings. From the status of being one of the minor diseases of tea, it has become a disease of major economic importance, because of its effect on clonal tea, the planting of which has been undertaken on a large scale in recent years. It is appropriate and timely, therefore, that we take a closer look at this disease, the reasons for its increase and the control measures that should be adopted to keep this disease under control.

This disease was first described by Petch (1923) and at that time it has been recorded only from Sri Lanka. Subsequently it has been reported from N.E. India (Tunstall, 1947). The disease is fairly widespread at the lower elevations and has also been found on a few mid-country estates.

"Canker" is a term applied to a particular type of injury, caused usually by the gradual killing of the bark at or around the site of infection. The normal process of stem thickening continues in spite of the infection, except beneath the dead zone, resulting in the formation of a slightly sunken area. The dead bark may fall out exposing the wood underneath. The healthy bark around the dead area thickens and a "callus" is formed, and this tends to emphasize the depression. The dead area surrounded by the callus is called a canker.

Symptoms of the disease

Plants affected by the disease show a very characteristic cankered appearance on the affected stem. The first signs of the disease are invariably overlooked since they appear as small, slightly sunken, oval patches on the bark of young branches of about pencil thickness, during the early part of the monsoon. These patches are caused by the activity of the fungus, which kills the bark over these patches, which then turns black and soft and later separate from the wood, exposing the wood below it. Under favourable weather conditions the attack dies away as quickly as it began, with the result that by the time the blackened patches are noticed, recovery has already begun with callus formation around the edge of the dead patch.

In mild attacks the affected patches are completely callused over within a few months and only a small scar will remain. During the attack small fruiting bodies or pycnidia are produced under the bark, and this may be covered over by the callus. When callus formation is incomplete, spores from the fruiting bodies or pycnidia may give rise to fresh infection and cases are often seen where branches have suffered annual attacks by the fungus until the disease has finally encircled and killed the stem.

It has been observed that in most cases the bark is killed and blackened uniformly down to the base of the infected branch and then the disease continues into the main stem. Having entered the main stem, the fungus may encircle it completely, and if this happens at the collar of the plant, the entire plant will be killed. Sometimes only the affected branch dies, the leaves withering and ultimately falling off. This type of attack is common in young tea which has not been cut back.

The fungus can also attack the upper surface of mature horizontal branches, killing the bark and discolouring the wood. After some time the dead bark peels off exposing the wood. The exposed wood is susceptible to infection by fungi that cause wood rot. Once wood rot sets in, the affected branch serves as a happy hunting ground for scavenging termites and as entry points for the low-country live-wood termite. As all these take place within the bush, the disease is not noticed until the bushes are pruned and by that time the canker and wood rot may be in an advanced state.

Factors favouring the disease

It has been observed that there is a relationship between the occurrence of drought and subsequent attacks by *Macrophoma*. Severe attacks of the disease are often observed after a period of prolonged drought. Moisture stress, therefore, is one of the main factors which pre-disposes the plant to infection. The effects of moisture stress on the incidence of this disease on the plants becomes more acute in the areas where the soil is very poor and where the organic matter content of the soil is low. In many cases the plants become susceptible to infection if they are not provided with the basic conditions required for growth.

Recent increase in the incidence of the disease

Several factors may have contributed to the recent increase in the incidence of this disease. The prolonged periods of dry weather that we have had in the past few years may be one of the reasons. The large scale planting with susceptible clones like TRI 2023 and TRI 2026 can be considered to be another contributory factor. But the most important factor, in the author's experience, is that in the recent past large scale replanting and new plantings have been undertaken without due attention being paid to soil conditions, the establishment of shade and the availability of thatching material. This has resulted in the establishment of very weak plants in the field. These weak plants, without adequate means for moisture conservation during dry weather, become very susceptible to attacks by *Macrophoma*. This would be a major reason for the failure of many new clearings planted in recent years.

Control measures

Measures that would help to conserve moisture in the soil during the dry weather would be a pre-requisite for the prevention of the incidence of the disease. It has been observed that the disease cannot be controlled by the planting of resistant clones, for no clone has been found to be resistant to the disease under conditions of severe moisture stress (Arulpragasam, 1983). Clones have been found to vary only in their degree of susceptibility to the disease. This disease cannot be controlled by the exclusive

use of fungicides. An integrated management strategy, combining various cultural practices have been found to be most suitable for the control and prevention of the incidence of the disease. Such a strategy should be adopted both in the new clearings as well as in mature tea.

(a) In New Clearings

(1) Avoid planting areas where the soil is poor and the rainfall is unevenly distributed.

(2) Do not undertake to replant an area larger than you can handle. The optimum area would be around ten acres.

(3) It is important to follow the soil conservation measures that are recommended during replanting (Advisory Circular No. S 4, Serial No. 4/84).

(4) Do not plant clones that are very susceptible to this disease. The clones listed below are arranged in increasing order of susceptibility: TRI 2025, TRI 2016, TRI 2045, TRI 2022, TRI 2043, TRI 2021, H 1/58, S 106, MT 18, KEN 16/3, DG 39, CW 21, TRI 2024, TRI 2027, TRI 2026, TRI 2023. As can be seen from this list, the clone TRI 2023, which has been a widely planted clone in the low-country is also the most susceptible.

(5) Before undertaking a new clearing ensure that sufficient thatching material will be available for thatching during the dry weather.

(6) A good stand of shade should be established before planting. Our experiments in the low-country have shown that a good stand of shade and timely thatching during dry weather can reduce the incidence of this disease appreciably, even in a clone like TRI 2023.

(7) It is important that the incidence of the disease should be kept to a minimum, up to the time of first prune. Infection of the main stem and primary branches should be prevented if the plant is to survive and be productive in the coming years. This could be achieved by following the measures suggested above together with the application of fungicides like Benomyl (Benlate) and

Bitertanol (Baycor) which have been found to be effective against this disease.

The fungicides should be applied with a knapsack sprayer, from the time of planting, once in 2 - 3 months, up to the time of the first prune. The plants should be given a drenching spray, and as the plants get bigger, care should be taken to see that the developing branches are also covered by the spray fluid.

It is preferable to use these two fungicides on alternate spraying rounds. In other words, if you start with Benlate use Baycor for the next spraying round 2 - 3 months later, and then Benlate for the next round and so on.

(b) In Mature Tea

(1) As in the case of young tea, a good stand of shade will reduce the incidence of the disease.

(2) In mature tea the disease is usually noticed at the time of pruning. This, therefore, is the best time to get rid of the cankered branches. The cankered branches should be removed just below the canker and the cut ends treated with a wound dressing. All the cankered branches should be removed as far as possible at the time of pruning.

(3) The pruned bushes should then be sprayed with the fungicides once in 2 - 3 months starting soon after the pruning operation. The fungicide should be applied with a knapsack sprayer, to wet the frames and branches thoroughly. The fungicides, Benlate and Baycor could be used on alternate spraying rounds as in the case of young tea.

(4) In instances where the plants have been killed as a result of the canker girdling the main stem, these should be uprooted and the vacancy thus created be filled by supplying with plants of less susceptible clones like TRI 2025.

REFERENCES

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