

# COLLAR CANKER IN CLONAL PLANTS CAUSED BY *LEPTOTHYRIUM THEAE* PETCH

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## Literature

Petch (1925) isolated a fungus from tea stems which he named *Leptothyrium theae*.

Gadd (1928) described a die-back of shoots and reported that he isolated the fungus *Leptothyrium theae* Petch. On the grounds of results of inoculation experiments he considered this fungus to be "but a weak parasite". He obtained positive results only when the shoots were wounded.

In 1930, Gadd reported a disease of tea branches which he later referred to (1936) as being probably caused by *Leptothyrium theae*. In 1936, Gadd again isolated *Leptothyrium theae* from diseased branches which were either ringed at the base or showed dead bark. Experiments showed that the isolated fungus "when introduced through a wound" caused a die-back of a shoot.

Since these investigations were carried out by Petch and Gadd, collar canker has been a regular though rather rare feature in the yearly pattern of diseases of tea in Ceylon.

*Leptothyrium theae* has also been found in South India but not in Assam. In South India this disease is of much greater importance than in Ceylon. The main damage done there by *Leptothyrium* is die-back, in the first, second and third years from pruning (Venkata Ram, 1959). Venkata Ram (1960) describes *Leptothyrium* as causing a die-back on young tea and advocates three prophylactic rounds of spraying with copper fungicides at fortnightly intervals be given soon after pruning, at the rate of 12 ounces in 10 gallons of water sprayed at 50-60 gallons per acre with a coarse nozzle. Furthermore, he stresses the danger of pruning in wet weather which can lead to serious damage by both *Macrophoma theicola* (branch canker) and *Leptothyrium theae*.

According to Venkata Ram, *Leptothyrium theae* enters the cut end of the pruned branch and causes die-back of the shoots developing from the affected branches. This description of the way of entering is rather in contrast with what Gadd mentions as probable places of entry.

According to Gadd, the disease starts as a small black depressed spot on the young green branch. He thinks that from this branch the cortex of the older branch is affected. If the green shoot has sprouted from near the collar the fungus can enter the collar region of the bark and cause the death of the bush. No mention is made of entrance through pruning wounds.

The two authors, however, agree on *Leptothyrium theae* entering through a wound and not through healthy bark either on young shoots or around the collar. This point is of extreme importance because it means that if we can avoid wounding altogether (and, if necessary, bend, thumbnail or prune only during drier weather conditions) we can avoid this disease.



Figure 1. Plant of clone E. M. 9 ringed at the collar by *Leptothyrium theae*.

## Symptoms and occurrence

The fungus *Leptothyrium theae* can cause three different types of disease:

1. die-back of shoots in young tea during the early years. Ringing of shoots at the base is apparent;
2. die-back of part of the plucking table because a major branch in the frame is ringed;
3. death of a whole bush due to collar canker which has ringed the bark completely.

In young tea, acute cases of die-back may be seen. In older seedling or clonal tea the first symptoms of branch die-back or collar canker are a pale yellow colour of the foliage and flower development. After pruning, the effect on the bark around the base of a branch or the collar is clearly visible and many branches recover badly or not at all. A branch canker caused by *Macrophoma theicola* is very often found to occur in conjunction with this collar canker disease. The branch canker occurs higher up on the branches and is characterized by long, dead strips of bark running down the branches.

The Chief Advisory Officer reports that it is evident from our records of past occurrences that *Leptothyrium theae* attack occurs most commonly at elevations of 5,000 ft and above, where strong winds or mist and generally damp conditions persist at certain times of the year. More rarely the disease has been recorded at between 4,000 and 5,000 ft but apparently not at lower elevations.

## Recent developments

Recently, clonal plants on three estates in the Uva district were affected by collar canker. This development has attracted attention because clones of the T.R.I. '20' series are involved.

Until lately the occurrence of deaths due to collar canker have been so rare that no special control measures were designed. Deaths were restricted to individual bushes and no large-scale attacks occurred.

It has, however, been recognized for some years that one of the risks of planting bigger areas with one clone of tea is the invasion by a disease which can affect all plants in the same way if the circumstances permit.

For the epidemic outbreak of a disease in a clonal planting there are at least three possibilities:—

1. the clone shows a high susceptibility to a disease with which it was hitherto not confronted;
2. a pathogenic organism has developed a strain which can readily attack one clone;
3. at the place where a clone is grown on a large scale, the climatic and cultural circumstances are such that the disease becomes epidemic.

Which of these possibilities is most likely to be behind the outbreak of *Leptothyrium theae* in the Uva district?

At St Coombs, *Leptothyrium* has occurred from time to time. According to the records of the V.P. Officer, Mr F. H. Kehl, Clone Brunswick M,9 is very

susceptible and was given up for that reason. A few cases occurred in clone Kenilworth 16/3. No collar canker was ever found in any of the clones of the 20 series. Clone TRI 2024 did not show any collar canker at the Passara sub-station. Hence, we can conclude that clone TRI 2024 is not specially susceptible to *Leptothyrium* attack.

The question whether the fungus has developed a new strain which can attack TRI 2024 is difficult to answer. In view, however, of the fact that so far *Leptothyrium* has survived on seedling tea, consisting of almost any genetic material available in the species *Camellia sinensis*, it is unlikely that any adaptation of *Leptothyrium* to TRI 2024 was necessary. It is therefore unlikely that this fungus would have taken years to develop a strain of special virulence to TRI 2024.

The most probable cause of the present attack on clonal plants in the Uva district is the occurrence of specially suitable circumstances created by both the climate and the treatment of the plants. The climate is such that the weather varies between extreme droughts and heavy rainfall. Such conditions are conducive to disease because the plant has to adapt itself to the changing conditions. During the drought period sun-scorch can occur, and during the wet period fungi can enter through the wounds. A plant exposed to such weather is more vulnerable. By a process of long adaptation locally selected clones would stand up better to such conditions.

The treatment of the plants could affect different clones differently. *Leptothyrium theae* is a parasite which enters through wounds. Cultural measures like bending, pruning and tipping create wounds. The capacity of the plant to heal these wounds rapidly determines whether a parasite can gain entrance.

The cases of *Leptothyrium* in the Uva district have shown that clone TRI 2024 is, under the conditions of climate and treatment there, more susceptible to this disease.

### **Future policy of bringing-into-bearing**

The question is now: is this a reason to abandon the planting of TRI 2024 altogether in this district?

This is not necessary if we can sufficiently adapt our methods of bringing this clone into bearing; evidently clone TRI 2024 gets damaged too much in this process. There is no evidence that *Leptothyrium* can penetrate in the undamaged bark of the collar; infection takes place on the wounded bark of smaller shoots.

By some changes in the treatment of this clone it might be possible to get the same result with much less damage to the bark. In the first place, the process of bending the young plant can do a lot of damage by the way of cracks in the bark and exposure which can lead to sun-scorch. Also, the branches bent over can be damaged by hail. Another danger of bending is that the branches come so near to the soil that, during heavy rain, drops of water mixed with sand may be splashed up from the soil and damage the bark of the young shoot.

Thumb-nailing would only leave a wound at the top of the shoot and thus create no danger near the collar of the plant.

Wind damage can create a port of entry for the fungus and therefore adequate protection against wind should be given, by interplanting with some green manure crop or supporting the young plant with prunings.

The best time for thumb-nailing and pruning is during a reasonably dry period, so that wounds do not stay wet so long that infection can take place. If these practices have to be carried out in wet weather it will be a good safeguard if they are followed by a copper spray applied rather liberally and at twice the normal strength.

Thumb-nailing has the additional advantage of producing a frame that branches considerably higher above the soil with the result that the humidity around it is lower. If bending is done very low then the lower part of the frame is spread out over the soil and sometimes embedded in dead leaves.

### Other measures of control

1. On those estates where collar canker is known to cause trouble it might be advisable to change the ratio of nitrogen to potash in favour of the latter. It is a well-known fact that many plants show a higher susceptibility to disease when nitrogen is given in excess compared with potash.

2. If die-back of branches in the plucking table due to *Leptothyrium theae* should occur, it will naturally be advisable to cut these branches off below the place of attack, in order to prevent the spread of the fungus through the bark into a main branch.

3. As a preventive measure, young tea should be sprayed during the period of bringing-into-bearing in wet weather and older tea should be sprayed after pruning.

### Conclusions

Although the attack of collar canker is now a threat to the existence of clone TRI 2024 in some fields above 5,000 ft on two estates in the Uva district, there is no reason to believe that this will develop into a major threat to TRI 2024 all over the district.

Apart from TRI 2024, several other clones have been attacked. So far, the record of affected clones from those estates which have reported *Leptothyrium* is: Tillicoultry 10, UD 30, TK 2 and TRI 2025. TK 2 was not sprayed at all until *Leptothyrium* was detected.

The fact that TRI 2024 is not very susceptible to Blister Blight and therefore not very often sprayed with copper fungicide may be an additional reason why this clone suffered specially.

The conclusion is that a few rounds of copper spraying after pruning to cover the frame thoroughly, and more frequent spraying of very young plants before pruning during wet periods, will probably be enough to bring the occurrence of collar canker in clonal plants back to reasonable proportions.

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