

# RING-BARKING OF SHADE TREES, ITS USE AND CONSEQUENCES IN CONNECTION WITH ROOT DISEASES

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The regular planting and removing of shade trees is an essential part in the normal management of an estate. If this is done according to a fixed scheme for the whole estate, then every field can benefit from a reasonably constant cover of shade trees.

One condition for achieving this is that the trees are felled at an age at which this can still be done without doing too much harm to the tea and the young shade trees already planted as future replacements.

This fairly early date of felling is also of importance in connection with the problems of root diseases. Very old and large stumps of shade trees form an ideal source of food for parasitic root fungi and they take a very long time for their entire decay.

Early felling is therefore advisable, but even then the stump can serve as a food-base for parasitic soil fungi, unless ring-barking is practised.

The growth of parasitic soil fungi like *Armillaria* and *Poria* depends on the food present in the roots they attack. If these roots contain starch their growth is much faster. The purpose of ring-barking is to deplete the food reserves present in the root.

How is this accomplished by taking away a ring of bark? In order to understand this I must explain how the food (carbohydrates), which is produced in the leaves, arrives in the roots. These products are transported in solution through the inner bark downwards to the roots where they are immediately used for the life of the roots themselves or transformed into insoluble starch and stored in the wood.

At higher elevations there is usually an excess of food production over food consumption because low temperatures inhibit growth more than they inhibit assimilation (production of food by photosynthesis). Therefore this excess is stored in the roots.

What is the effect of ring-barking on this process? The downward movement of food is stopped. The roots do not receive food any more and start consuming locally stored reserves. As soon as these reserves are depleted the roots stop functioning properly. This means they cease to take up enough mineral nutrients and water for supplying the growing parts of the tree. Wilting and yellowing of leaves sets in. All growth is stopped and the leaves die and fall. In the process of dying, some trees produce flowers.

All this happens only when the bark and nothing more than the bark is cut away properly. If the bark is not completely removed, so that callusing-over occurs, then some transport starts again downwards and the process of dying is

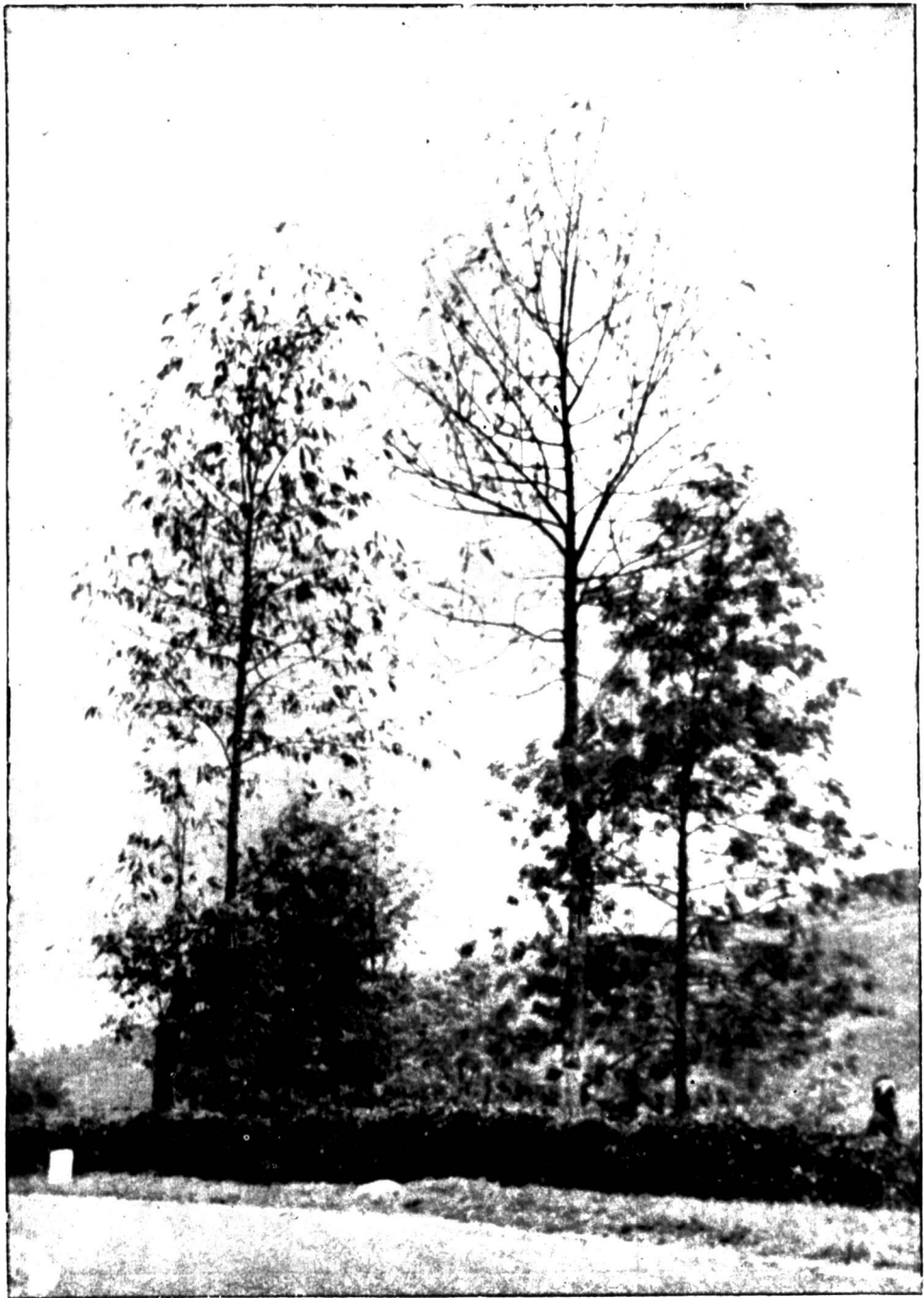


Figure 1. *Grevillea* trees with foliage dead but still hanging, due to abrupt death caused by too deep ring-barking.



Figure 2. Basal part of a *Grevillea* tree showing where too much wood was taken away in ring-barking.

prolonged or even reversed. If the outer layers of wood are removed as well as the bark (Fig. 2) then the upward transport of water through the wood is also stopped, with the result that the tree dies suddenly (Fig. 1) and the starch reserves of the root are not fully depleted.

Because of the danger of the ring callusing-over and the additional labour involved in the process of cleaning up, some estates have the habit of taking away part of the wood also, with the result described above. Because of the danger of infection of the stump with a root parasite (*Fomes*, *Poria*, *Ustulina* or *Rosellinia*) this is a very bad practice and should be abandoned. In short, it defeats the purpose of ring-barking by overdoing it.

Even if the stumps left in the field are depleted of starch, there is always a chance that a root parasite will get in. In order to reduce this chance still further it is a good practice to cut the stump as low as possible and cover it with earth (Gadd, 1949). This prevents fungal spores of root-rot organisms from germinating on the cut surface of the tree, and it promotes rapid decay.

The rapid decay of stumps is not only of importance in connection with the occurrence of root diseases, but also because of future replanting plans. After the uprooting of the old tea, large shade tree stumps in various stages of decay either form a hindrance to the proper planting of new tea or are costly to remove. The smaller the stumps, and the quicker they decay, the better.

#### Reference

- GADD, C. H. (1949). The common diseases of tea. *Monogr. Tea Prod. Ceylon*, No. 2, 94 pp.