PLANTING ON PORIA-INFECTED AREAS

D. Mulder

No one knows exactly how long a fungus in one form or another can stay alive in soil, but it is known that resting bodies (sclerotia) of certain fungi can survive for many years. This is most probably also true for the mycelium threads of *Poria hypolateritia* on woody roots. Therefore, replanting on old *Poria* patches carries a considerable risk of recurrence of the disease.

Poria disease originates from stumps of jungle trees; the stumps of Dun trees (*Doona gardneri*) are said to be especially dangerous. It is possible that this tree got a bad name because of the hardness and persistence of its stumps rather than because of any specific relation to *Poria*. In any case, it is a fact that many *Poria* areas are notable for the large number of jungle stumps in them. After the disappearance of the jungle stumps, the *Poria* survives in tea roots and shade tree stumps (especially *Albizzia moluccana* and Dadap).

How can re-infection of young tea with *Poria* be prevented? The clearing of infected material from the soil is only partially effective. No one will pretend that, after removing all roots of more than pencil thickness down to a level of 3–4 feet, all infected material has gone. *Poria* areas should, therefore, if possible, be kept longer under Guatemala grass than is normal for areas to be replanted, in order to starve the remaining *Poria* mycelium to death. If only parts of the area being replanted are affected, these could be marked off by planting the borders of the *Poria* areas with *Tephrosia*. This would at least indicate whether any *Poria*-infected material has been left in the soil along the border, for *Tephrosia* then soon wilts and dies.

We have no indication that any tea bush or clone is more resistant to *Poria* than another. When certain bushes survive for a time in a *Poria* patch, this may be due to better soil conditions locally, so that these bushes can develop new roots and survive longer. Another reason for a delay in the ultimate death of a bush might be that locally the water supply is better, which would reduce the wilting of the bush that is caused by *Poria* attack.

A special measure that could be taken before replanting a *Poria* area, in order to reduce the risk of recurrence of the disease, is the improvement of soil conditions, especially in organic matter content. The mixing of the top soil with a fairly big quantity of cattle dung or compost in the infected area would stimulate the growth of saprophytic fungi, which live on the compost, and reduce the chance of *Poria* reaching the tea roots (Sanford 1946). The interference of saprophytic fungi with the growth of *Poria* is under investigation at the moment and it has already been shown in the laboratory that a common soil fungus like *Trichoderma viride* strongly inhibits the growth of *Poria* (see Figures 1 & 2) (Allen & Haenseler 1935). Increasing the organic matter in the soil would stimulate the growth of this fungus.

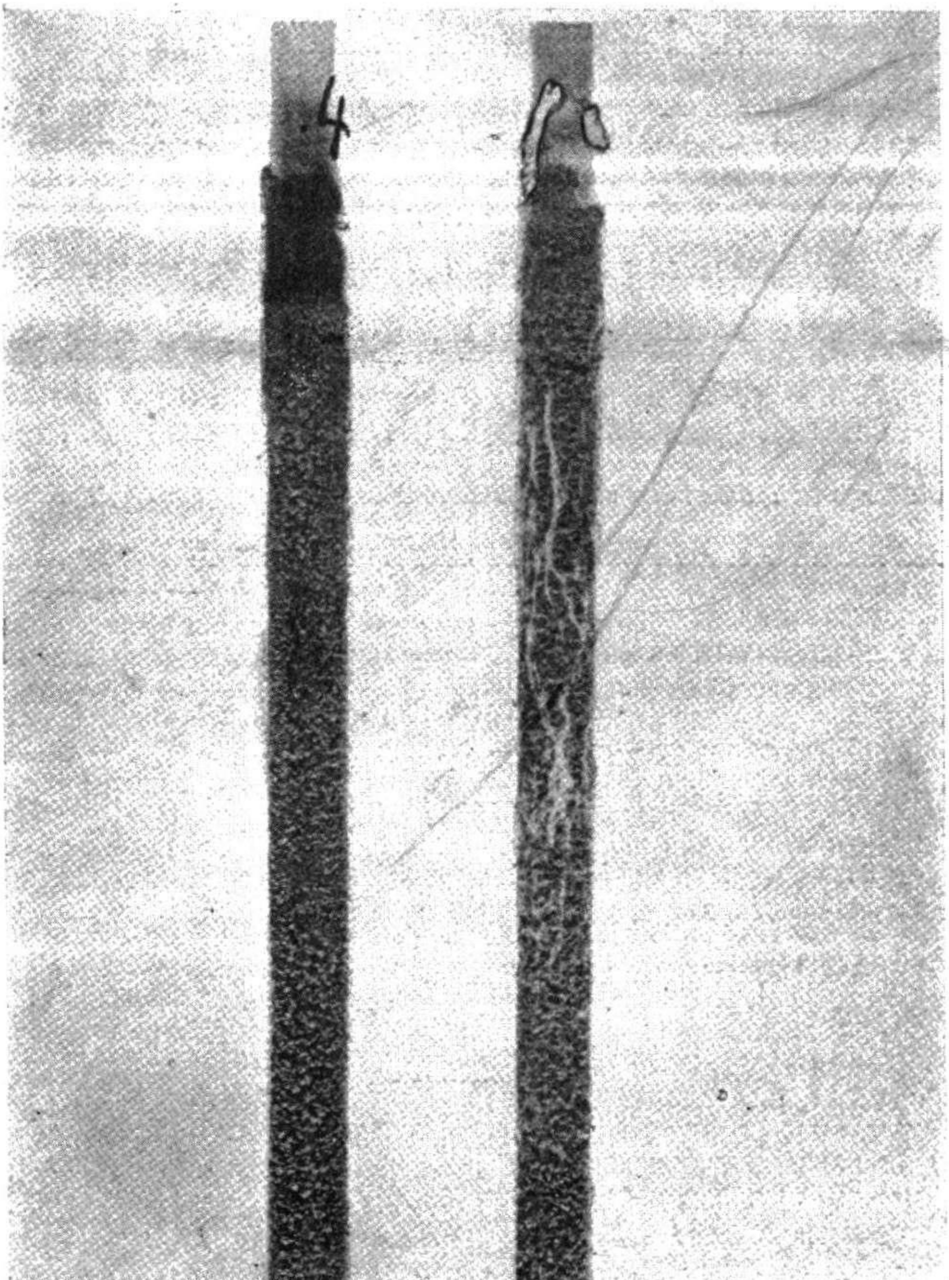

Fig. I.— Growth of *Poria hypolateritia* in clay soil. Both tubes have been inoculated with *Poria*. The tube on the left contains soil which has been inoculated with a dilute suspension of *Trichoderma viride*; the tube on the right also contains clay soil without *Trichoderma*. Only in the tube on the right is the growth of the mycelium of *Poria* conspicuous.

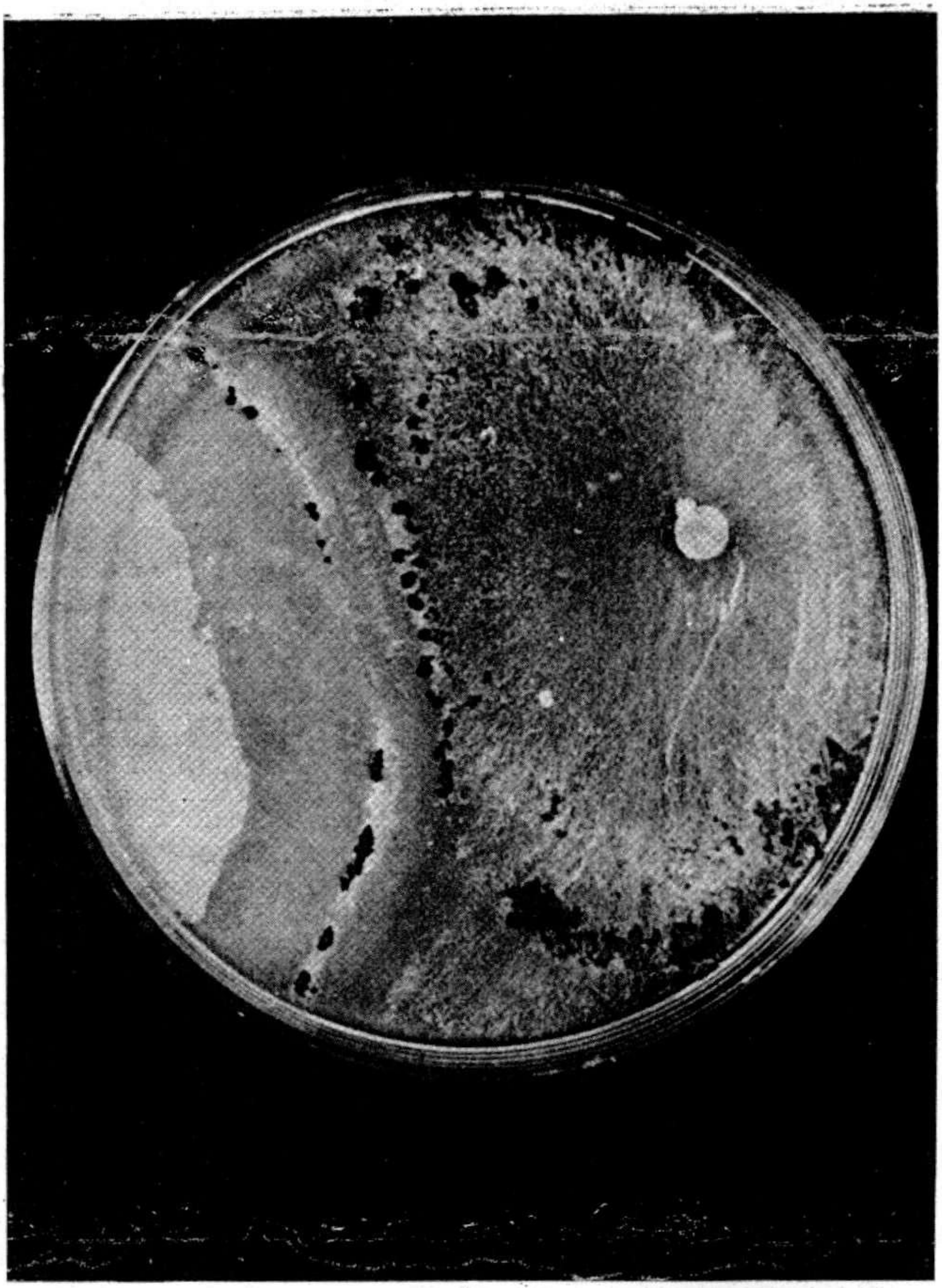

Fig.2.— Antagonism of *Trichoderma viride* to *Poria hypolateritia*, growing on potato-dextrose agar jelly. The Agar was inoculated with the *Poria* fungus (*left side*) five days before inoculation of *Trichoderma* (*right side*).

Trichoderma viride is a soil fungus which does not attack living plants but lives on dead organic material (*i.e.* a saprophyte, not a parasite). It frequently appears on the surface of steam-sterilised soil and has a high resistance to chemical soil disinfectants. It occurs in soils in almost all climates. Its ability to kill parasitic (and other) soil fungi by its secretion products is a very remarkable feature and is only over-shadowed by its ability actively to parasitize other soil fungi, such as the fungus called *Rhizoctonia*, which is the cause of a damping-off disease of seedlings (Weindling 1934). The effects of this fungus (*Trichoderma*) on parasitic root fungi have been studied in detail for *Armillaria* root rot of Citrus trees (Bliss 1951) and *Fomes annosus* root rot of pine trees (Rishbeth 1950, 1951, 1951a).

Ceylon tea soils are very suitable for the growth of this fungus in that it requires an acid soil. We have only to supply the necessary food in the form of organic material for its abundant growth. Its rapid growth in sterilized soil is due to the fact that the process of sterilization makes much more food available. In this connection the effect of partial soil sterilization by soil disinfectants (formalin, carbon disulphide, mercury compounds, etc.) and by soil fumigants has to be considered (Garrett 1957). It has been found that *Trichoderma* has a markedly higher resistance to various soil disinfectants than have parasitic soil fungi and therefore it survives the treatment. Garrett (1956) writes in his book "Biology of root-infecting fungi" that *Trichoderma* has been reported as the dominant fungus in soils after treatment with chloropicrin, D-D, and carbon disulphide.

Treatment of the soil with D-D against eelworms would therefore most probably have an indirect effect on *Poria* through the increase in population of *Trichoderma viride.* Unfortunately D-D cannot be used around existing tea plants because of its phytotoxicity. Nemagon, on the other hand, has no damaging effect on tea at dosages up to twenty gallons per acre and could serve both purposes, but the cost is too high for ordinary use.

There is thus reason to believe that if we create the proper circumstances for the growth of *Trichoderma*, it can play a useful part in the control of *Poria.*

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