RESULTS OF A SURVEY OF RED ROOT DISEASE (*PORIA HYPOLATERITIA* BERK.) IN CEYLON TEA

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From 10th July, 1961 to 19th June, 1962 a census of the occurrence of Red Root Disease in tea was organized, and a circular letter was sent to 112 high-country estates which had in the past, according to our records, reported *Poria.*

After almost a year, a total of 105 answers had been received (see Table I). Fourteen estates reported that no *Poria* was present but, as our records show that all these estates have sent in specimens which were identified as being infected with *Poria,* we must conclude that *Poria* is nevertheless present on these estates, though to a very small extent.

Of the 91 remaining estates, 50 estates considered *Poria* as of major importance, whereas 41 estates reported *Poria* of lesser importance. The 50 estates cover an area of 57,608 acres which is roughly 10% of the total tea acreage in Ceylon and over 25% of high-country acreage. If we calculate the total acreage infected with *Poria* on the 91 infected estates it comes to approximately 776 acres. This is roughly 0.75% of their total acreage.

The 50 severely infected estates have 734 acres of *Poria*-infected land. This is 1.3% of their total acreage.

About 45% of the infected area has so far been treated for control of *Poria.* This means that we may be nearly half-way through the job. However, 37 of the 50 estates (or 74%) report recurrences along borders of old treated patches, which considerably reduce the value of the work already done.

In addition to this, we learn that 41 of the 50 severely infected estates report new occurrences in old mature tea. This indicates that the *Poria* fungus is not only very actively spreading through the soil from bush to bush, but is also passively spread by some other agent, most likely the labour force. This is possible because more than half of all *Poria* patches are left untouched by any control measure.

If on a majority of estates a number of treated patches are not definitely cured, and a large majority of estates report new cases in old tea, then the only conclusion can be, that although 50 estates have spent nearly two million rupees in five years on measures against this disease, the situation is still not well in hand.

It is difficult to say whether this disease is on the increase or whether the measures taken have reduced the extent of *Poria.* This is the first census taken. Further surveys will probably give the answer.

Scientifically-supported control of this disease has now been carried out for more than 30 years with a gradually increasing intensity. As early as 1928 a recommendation was given by the Institute for the control of Red Root Disease (Gadd, 1928, 1929). Removal of apparently healthy bushes around an infected area was considered essential.

TABLE 1.—*Poria Survey*

1. *Poria* questionnaire sent to 112 estates (which were known from the records to be infected).
2. Answers received numbered 105 (seven estates did not answer).
3. *Poria* reported as still present on 91 estates (14 estates reported no *Poria* present, although they had earlier sent *Poria* infected material).

	SERIOUS ATTACK	MINOR ATTACK	TOTAL
1. Number of estates ...	50	41	91
2. Acreage ...	57, 608 acres	48, 951 acres	106, 559 acres
3. Extent of *Poria* area ...	384 acres and 7,965 patches (734 acres)	972 patches (42 acres)	384 acres and 8,937 patches (776 acres)
4. Extent of *Poria* area treated ...	278½ acres and 1,327 patches (335½ acres)	516 patches and 8½ acres (23 acres)	287 acres and 1,843 patches (358½ acres)
5. Extent of *Poria* area left untreated ...	288 acres and 2,378 patches (398½ acres)	268 patches (19 acres)	288 acres and 2,646 patches (417 acres)
6. Expenditure for the past 5 years ...	Rs. 1,918,894/-	Rs. 58,960/-	Rs. 1,977,854/-
7. Average cost per acre ...	Rs. 5,700/-	Rs. 2,560/-	Rs. 5,517/-
8. Recurrences along borders of treated patches ...	37 estates	14 estates	51 estates
9. New occurrence in old tea ...	41 estates	18 estates	59 estates
10. Presence of trained *Poria* gang ...	44 estates	15 estates	59 estates
11. More *Poria* and faster spread in high jat tea ...	28 estates (yes)	12 estates	40 estates
12. Kind of tea *Poria* occurs in:—(*a*) high jat (*b*) low jat (*c*) mixed ...	(*a*) 14, (*b*) 3, (*c*) 31	(*a*) 13, (*b*) 4, (*c*) 15	(*a*) 27, (*b*) 7, (*c*) 46
13. Worst *Poria* attack in tea planted after (*a*) Jungle (*b*) Coffee (*c*) Both ...	(*a*) 13, (*b*) 11, (*c*) 10	(*a*) 11, (*b*) 6	(*a*) 24, (*b*) 17, (*c*) 10
14. Infected area as a percentage of the total acreage of infected estates ...	1.3%	0.09%	0.75%

Gadd (1929a) advocated that trenching should be substituted by removal of a "belt of perfectly healthy tea". Liming of the soil was considered to be beneficial to the fungus since Gadd (1929a) found that *Poria hypolateritia* grows best in soil of a pH of 6.3. Since then the recommendation for *Poria* control has remained practically the same. Eradication seems still to be a far-off goal. The word eradication introduces a new line of thought. Would it be possible to get rid of this disease instead of fighting an endless battle against it?

Eradication of a disease is only possible if it is within our power to control the sources of infection.

The spread takes place in two ways:

(1) through the soil by means of mycelial strands (rhizomorphs) from root to root; and

(2) through the air from field to field or from jungle to field by means of human beings carrying infected wood (stumps, roots) as firewood and dropping pieces of it between healthy tea.

Theoretically there is a third way, namely, by means of spores produced by fruiting bodies on old infected stumps, which infect healthy tea. This last way of spread does not count as important in practice because hardly any fruiting bodies are made on tea. Infection by spores produced in the jungle is also considered unlikely. Eradication now depends on whether the two sources of infection mentioned can be brought under control.

Judging this problem phytopathologically, one would be inclined to think that, if this problem can be tackled in time, it should indeed be possible to reach a stage quite near to complete eradication.

The second question would be whether eradication is economically feasible. This is much harder to answer because this depends on so many factors outside the estate.

The fifty severely infected estates are reported to have spent, in five years time (1956–1961), nearly two million rupees (Rs. 1,918,894) on *Poria* control. Measures against *Poria* were started more than 30 years back, so they may have spent several million rupees in all since the beginning. Now we are about halfway through the job and we are not too sure that the first half will prove a success, due to recurrences along the borders of old patches. Even if the second half could be carried out in such a way that success is ensured, several millions of rupees would again be involved.

From the figures obtained it can be calculated that the average cost per acre of *Poria* eradication by the prescribed methods given by the T.R.I. is $\pm$ Rs. 5,700 for the 50 estates severely infected. The most costly operation is no doubt the digging-up of the soil to a depth of three to four feet. If this could be replaced by chemical disinfection of the soil the total costs would be greatly reduced. The first results of disinfection of the soil with D-D are very encouraging. These results were obtained with *Tephrosia* as an indicator crop instead of tea.

The cost of this operation will be about Rs. 2,000/- per acre. A considerable saving on the cost of *Poria* control would result. This might indeed enable us to change from a policy of mere control to one of *Poria* eradication.

The time for more drastic measures against *Poria* is rather auspicious in view of the fact that areas bigger than one acre come under the Tea Replanting Scheme and are subsidized. It would therefore be wise to consider whether a *Poria* area cannot be enlarged in such a way that it comes under the Replanting Scheme.

The problem is also urgent because the change from old seedling tea to young V.P. tea gives us a good chance to get completely rid of *Poria*. In old tea *Poria* can linger without showing up in the form of dead bushes. In young tea, however, the bushes die abruptly and individually before any spread has taken place, and if *Poria* eradication is taken in hand at this stage by careful digging-up of the young plant *with* its source of infection then it is very likely that no *Poria* will occur thereafter.

TABLE 2.—*Districts showing number of tea estates with Poria*

District		*Serious attack*	*Minor attack*	*Total*
Dimbula	...	17	5	22
Badulla	...	2	9	11
Nuwara Eliya	...	6	4	10
Dickoya	...	7	0	7
Punduloya	...	5	1	6
Pussellawa	...	4	2	6
Haputale	...	1	3	4
Maskeliya	...	1	2	3
Uda pussellawa	...	1	2	3
Ratnapura	...	0	2	2
Maturata	...	0	2	2
Matale	...	0	2	2
Balangoda	...	1	1	2
Kelebokke	...	1	0	1
Madulsima	...	1	0	1
Hewaheta	...	1	0	1
Nilambe	...	1	0	1
Ramboda	...	1	0	1
Matara	...	0	1	1
Rangala	...	0	1	1
Kotmale	...	0	1	1
Dolosbage	...	0	1	1
Passara	...	0	1	1
Knuckles	...	0	1	1

Summary

1. The Red Root Disease caused by *Poria hypolateritia* is still the most widespread root disease of tea notwithstanding the fact that control measures have been in operation for the last 30 years.

2. From a survey of 112 estates, it can be concluded that about half of all *Poria* areas have been treated but that the success is not complete.

3. The question whether eradication is possible and economically feasible is discussed.

4. It is concluded that if advantage is taken of new developments in soil disinfection and the subsidy of the Tea Replanting Scheme the time is now ripe for eradication.

5. The point is stressed that eradication in young tea is fairly easy whereas in old tea it is very difficult.

References

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