"SUN-SCORCH" OF EXPOSED LATERAL ROOTS OF *HEVEA BRASILIENSIS.*

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Recently, * attention has been drawn to an affection of *Hevea brasiliensis* both in Ceylon and Malaya the fundamental cause of which affection has been ascribed to a combination of weather conditions during the wintering period of 1925, the cumulative effect being a secondary fall of the newly developing leaves some time after wintering.

This year, 1926, an entirely different set of weather conditions has been encountered in Malaya. The usual dry period, which is helpful for a good wintering, was of long duration and the plantations were practically leafless for a comparatively long time. The usual wintering is somewhat uneven in Malaya; as a rule, some trees retain their foliage until trees wintering earlier are already producing new leaves. Thus, in most years, there is a fair amount of shade in parts of the plantation.

The weather conditions during the wintering period of 1926, were such as to produce the most even wintering in the writer's experience. The trees were leafless all at the same time, and the temperature was particularly high during the wintering period of this year.

During the last few weeks attention was drawn to an affection of exposed lateral roots, the symptoms of which suggested the well-known symptoms of lightning-strike or scorching. The disease was first noted on a hilly

* Sharples A.—Hevea Mildew in Ceylon and Malaya, Malayan Agricultural Journal Vol. XIV. April 1926, No. 4.

estate, where the lateral roots on the hillsides were likely to be more exposed than on flatter land. On these exposed roots, slight cracks appeared in the bark, which on further examination showed a much greater extension of apparently scorched and dead, dry bark than the cracks in the bark would indicate. Wounds, often two feet in length, had to be made to clear out the diseased tissue. The wood beneath the dead bark showed the usual, greyish discoloration typical of *Hevea brasiliensis* when attacked by the *Diplodia* sp. which causes the " Die-back " of branches of Hevea. The wound was not penetrated to any great depth, the deepest being about one inch, but the wood penetration went beyond the limits of the dead bark. The fungus was progressing slowly along the wood, and not in the bark. A yellowish discoloration was often seen on the inner boundary of the greyish, discolored wood.

At first, the affection seemed to warrant serious attention for a 10 per cent. infection was counted. Besides this high percentage infection, the rapid and often serious effects of lightning-strike had to be taken into consideration; when the cortex of the trunk is scorched over the whole length of the tree, as by lightning, the progress of the *Diplodia* fungus is very rapid and death may ensue very quickly. As mentioned above, the fact that extension was taking place in the wood, and not in the cortex, was a matter for satisfaction.

Little could be done except to advise measures for cleaning out the diseased tissues and preventing further spread. Specimens were obtained in the laboratory and isolations and inoculations were undertaken. The isolations all yielded the expected *Diplodia* sp. The inoculations, both in wounded and unwounded roots, with large portions of diseased tissue were negative 14 days after inoculation. This led to the conclusion that, only under exceptional conditions, was the disease likely to spread rapidly.

In the search for contributory causes the question of the apparent scorching was not easily answered. No fires had been reported and although lightning plays many pranks, the position of the wounds and distribution precluded this explanation. There have been no previous records of " Sun-scorch " but this seemed to afford the likeliest explanation and there seems little doubt when the distribution of the disease is studied from this stand-point that " Sun-scorch " is the main contributory cause of this particular affection.

If the hilly divisions with an East and West frontage are considered, it is found that starting out from the East face no cases of scorched exposed lateral roots could be found. As a move is made round the hill to the west a few isolated, lightly affected cases will be found, until the west face is reached, when several trees in the same row often will be found affected. If a move is made from East to West over the top of the hill, the same phenomena are met with; no cases on the East, a few isolated cases on the top, then a heavy infection on the west side. Moreover, on single trees with several roots exposed all round the tree, those facing west are heavily affected, while those on the Eastern side which would be shaded by the trunk during the hot afternoon sun, were not affected or only very lightly affected.

The evidence collected in this manner appears conclusive, the explanation being that trees with exposed lateral roots situated on a slope facing West, received the direct rays of a very hot afternoon sun, during a period when the trees were leafless and shade was absent, owing to the extraordinary, even wintering of 1926. The scorched areas are next attacked by the *Diplodia* sp. common on rubber, which rots the bark and penetrates slowly in the wood.

In advising control measures, care had to be taken to see that the fungus had not penetrated into the trunk of the tree. Some of the wounds on the lateral roots initiated by sun-scorch, were almost in contact with the stem; numbers of these were cut as near the trunk as possible but in no case was there any definite penetration into the trunk of the tree.

The best form of treatment would be the excision of all the attacked wood and cortex. On a large percentage of roots this would hardly be feasible, as the scorching often produced several wounds on an individual root; these have later joined together to produce a diseased area many feet in length. Such a length of diseased wood would be difficult to excise and in such cases it would be a better plan to cut through the root in healthy tissue, take the diseased root out of the ground and burn. Where wounds are small, the diseased tissue can be chiselled out with broad, flat chisels, the exposed surfaces painted with a strong solution of Solignum or Jodelite, to be followed later by a generous application of Tar.

On some estates shortage of labour may interfere with the progress of the work of excision and some simpler method may be advisable. Even in the early stages the healthy cortex is forming a broad callus edge round the diseased wound and natural recovery may be possible in many cases. On one estate, no excision of diseased wood is being done; the scorched and dead bark is cleaned away thoroughly and in this connection, care must be taken to cut down the callus tissue, which overhangs to form a cavity, level with the wood surface. If this is not done, the preventive paint will not reach the tissue protected by the overchanging callus, and water may collect in the cavity. Such a condition would be most favourable for the entry of some of the more serious wood-rotting organisms which are partial to *Hevea*, and considerable damage might be done. Having scraped away the loose decayed cortex, and cut down the callus edges, the exposed surfaces are painted directly with a mixture of 50 per cent. Tar and 50 per cent. Solignum.

It is too early to report fully upon the respective merits of these methods. A later report will be issued.

Note:—Since going to press the typical symptoms have been reproduced in inoculation experiments when the bark of exposed lateral roots is, previous to inoculation, scorched by fire. In some cases the scorching alone is sufficient to initiate the disease, as was shown by the control experiments, in which no inoculating material was used. A further report will be issued on completion of the inoculation experiments.—The Malayan Agricultural Journal, Vol. XIV., No. 5.

THE EFFECT OF FERN AND OTHER GROWTH ON THE HEALTH AND GROWTH OF THE RUBBER TREE.

The following extract from the article on " The Effect of Fern and other Growth on the Health and Growth of the Rubber Tree " by F. G. Spring, Agriculturist (Rubber) of the Department of Agriculture, S.S. & F.M.S., is taken from the *Malayan Agricultural Journal*, Vol. XIV., No. 5:—

The writer recently visited seven estates for the purpose of inspecting rubber trees growing on areas under ferns and to arrange, if possible, for experimental work to be undertaken which might throw some light on the health and growth of the rubber tree in fern areas.

In the writer's opinion, only on one of these estates is there any evidence to support the argument that ferns are harmful to the rubber tree. The trees on this property are very backward in growth and have not the healthy appearance of those growing in adjacent clean-weeded areas. The leaves have a pale unhealthy colour, the tips of several of the branches are dead and the rubber can only be described as very poor. There is a small amount of lallang but whether it is present in sufficient quantity to be an influencing factor is questionable. The ferns are about four feet in height and have afforded dense cover for the past eight or nine years. This is far too long a period without cutting the ferns back. On the estates where they are cut back periodically no harmful results were found; how often cutting back is necessary is a matter for investigation.

Ferns provide an effective cover for the prevention of soil wash and are particularly valuable on areas where other vegetation is difficult to establish. They also retard the growth of lallang and keep the soil in a soft, moist condition.

The trees on all the estates visited with the exception of those on the property mentioned, look healthy and are well grown. The foliage is generally excellent and the bark thick and succulent. In the absence of experimental data, however, it is only possible to express an opinion that ferns are not harmful, in old rubber areas, provided the cover is free from lallang or other noxious weeds and is cut back occasionally. It is hoped that the tests about to be undertaken will throw light on the subject and provide some definite information as to the value or otherwise of ferns as a cover plant. The type of fern or moss best suited for the purpose requires investigation. Tall growing ferns must be cut back periodically; if left for a long period the remaining stubble is so strong that it is difficult for labourers to work, in any such area, without injury to the feet. Cutting is best done at the commencement of a wet season in order that the material may be left on the land without danger of fire. Tall growing ferns, if never cut back, are objectionable on account of the difficulties of supervision and the labourers' work.