PESTS AND DISEASES.

MYCOLOGICAL NOTES.

RHIZOCTONIA BATATICOLA (Taub.) Butler.

W. SMALL, M.B.E., M.A., B.Sc., Ph.D., F.L.S.
Mycologist, Department of Agriculture, Ceylon.

The name of the fungus *Sclerotium bataticola* Taub. which was the subject of Mycological Notes in the August number of the *Tropical Agriculturist* has been changed to *Rhizoctonia bataticola* (Taub.) Butler. The fungus has thus been transferred from the genus *Sclerotium* to the genus *Rhizoctonia*, and, as such changes are made for good reasons (which need not be discussed here), the new name must be adopted in Ceylon. *Sclerotium bataticola* will therefore be known in future as *Rhizoctonia bataticola*, and it is hoped that the change of name will not lead to confusion.

In the Notes mentioned above, the fungus was reported to occur on tea, beans, dadap, *Albizzia*, *Acacia*, *Tephrosia*, *Clitoria*, *Grevillea*, cypress and soursop. These records were new for Ceylon. It was pointed out that exact knowledge of the status of the fungus, particularly as regards its woody hosts, was required ; at the same time, it was made clear that, in the present state of our knowledge, *Rhizoctonia bataticola* could not be regarded as primarily responsible for the deaths of all the plants on which it was found, especially those on which a second fungus occurred along with the *Rhizoctonia*. It may be added that the discovery of a new root fungus on tea does not imply an increase in the gross amount of tea root disease in Ceylon, even if the fungus in question should be found alone, as it has been, on tea and even if it should be proved to be capable, as it may, of causing tea disease unaided. It means in this case that the *Rhizoctonia* has not been taken into account in the past and that its presence adds one more to the number of fungus agents causing or associated with tea root disease. The *Rhizoctonia* is thus to be regarded as a new agent, the full and real significance of which is not clear at the moment. Since it will not be surprising if it proves to be of economic importance, it is worthy of extended study.

Further data regarding the fungus in Ceylon have been acquired, and it may be of interest to discuss shortly its new hosts and the conditions of its occurrence upon them. With the exception of chillies, a fruit rot of which has been attributed to *Rhizoctonia bataticola* in the United States of America, and cacao, a root disease of which was caused in Uganda by the same fungus, the following records are new for other parts as well as for Ceylon.

(1) *HEVEA BRASILIENSIS.*—The *Rhizoctonia* has been found on Hevea in three cases, in one of which a single tree was involved and in another of which some four or five trees harboured the fungus. In the first case attention was drawn to the tree by the appearance of fungus fructifications on the soil near the trunk ; they proved to be connected with a root which was near the surface. The tree was apparently in good health, but, despite its appearance, excavation showed that two-thirds of its roots were diseased, and immediate amputation was recommended as a possible means of saving it. The fructifications on the

soil were immature but were identified as those of a *Xylaria* (probably *X. Thwaitesii* Cke., to which a root disease of Hevea in Ceylon has been attributed), and the mycelium of the *Xylaria* was found on the exterior of the diseased roots. The wood, however, was permeated by the *Rhizoctonia*. The characteristic sclerotia and black lines or sclerotial plates were found in it in quantity, and it was hardened in the usual manner. The affected tree was treated as advised and is still in an apparently healthy condition. One side of it, however, is dry, and it is probable that it is dying slowly. In the second case referred to, the trees were dying back and had become stag-headed. Examination showed that their larger roots were healthy, while the smaller laterals were diseased. The only fungus found upon the diseased roots was *Rhizoctonia bataticola*. Several of the affected trees have been left for future re-examination, the idea being to determine roughly how far the *Rhizoctonia* has progressed in a given time and what fungi, if any, have attacked the roots subsequent to the *Rhizoctonia*. In the third case, *Rhizoctonia bataticola* was associated with *Sphaerostilbe repens*. The affected tree had been growing in a damp situation, and diseased roots were therefore damp. Their wood, however, was typically hard and it contained numerous sclerotial plates.

(2) *GARDEN ROSES.*—*Rhizoctonia bataticola* has attacked roses. The leaves of affected plants became yellow and then fell. The sclerotia of the fungus were found in the wood and bark of the roots, and no other fungus was present.

(3) *HEDGE PLANTS.*—The plants in question were *Hibiscus* and *Aralia filicifolia*, and *Poria* was present on all the specimens in addition to the *Rhizoctonia*. The association of the *Rhizoctonia* and *Poria* is new; on tea specimens, no other fungus has yet been found along with *Poria*. The sclerotia and hyphæ of *Rhizoctonia bataticola* were numerous in the pith of the lower part of the *Aralia* stem.

(4) *CUSTARD APPLE.*—In this case, an unidentified wood-rotting fungus was present along with the *Rhizoctonia*.

(5) *CHILLIES.*—Specimens of chillies attacked and killed by *Rhizoctonia bataticola* were received from the Plant Pests Inspector, North Western Division. The symptoms of the disease were typical. Sclerotia were found on the hardened wood of the roots, and no other fungi were present.

(6) *CACAO.*—A consignment of diseased cacao from the Experiment Station, Peradeniya, was examined for root disease towards the end of July. *Sphaerostilbe* and *Ustulina* were found on parts of the material and the symptoms of *Rhizoctonia bataticola* on every piece. The last-named fungus, however, was not actually found. A second consignment of seven trees was received at the end of August, and *Rhizoctonia bataticola* was discovered *in situ*. As in the first lot of material, the hardening of the root wood was apparent on every specimen. Other root fungi were represented by *Ustulina* which occurred on only one of the specimens. A *Nectria* was present on the stems. The reason why the *Rhizoctonia* was found only on the second lot of material was that many of the smaller roots were in position. When dead trees are wrenched from the ground instead of being carefully dug up, the smaller roots are apt to be lost, and, as it happens that, in many cases, *Rhizoctonia bataticola* is to be found only on such roots, its presence may be easily overlooked,

(7) A South American and West Indian tree called *balsa* or cork-wood *(Ochroma Lagopus* Sw.*)* has been attacked by root disease. Only one piece of root was sent for examination. A small quantity of *Fomes* mycelium (probably *lignosus)* was present on the bark of the root, while sclerotia and sclerotial plates or lines of *Rhizoctonia bataticola* were present in and on the wood which was typically hardened.

The last case is of special interest inasmuch as the victim of the fungus is a recent introduction, and it recalls the state of affairs in Uganda where all the plants susceptible to *Rhizoctonia bataticola* were recent introductions. All the known Ceylon hosts are also introduced plants. The cypress seedling reported as a host of the *Rhizoctonia* was probably a species of *Juniperus*, but there is no doubt of its being an introduced plant.

It was remarked in the former Notes that the extension of the host range of *Rhizoctonia bataticola* in Uganda to include so many woody plants was worthy of note, and attention may be drawn to the similarity between, and, in several cases, the identity of, the Uganda and the Ceylon hosts of the fungus. Further, it will be observed that, as regards Ceylon cases, other fungi have again been found to be associated with the *Rhizoctonia.* With reference to tea in particular, cases have been examined lately in which *Rhizoctonia bataticola* has been associated with *Diplodia, Fomes lamaoensis* (the fungus of brown root disease), *Fomes lucidus, Rosellinia, Ustulina* and *Polyporus interruptus.* It is not suggested that the *Rhizoctonia* is the dominant partner in the combination of *Rhizoctonia* and another fungus, but it is worthy of remark that the *Rhizoctonia* is invariably found to have attacked the feeding roots of the plants. This state of affairs points to the need for experimental work designed to separate, as it were the various fungus elements which are associated with a case of root disease and to show, if possible, which of the elements is the primary cause of disease. Part of the work consists of the examination of large numbers of specimens of root disease. The greater the number of specimens available, the more reliable and valuable will be the conclusions drawn from their examination, and it would therefore be a great help if planters and others would submit root diseases for examination instead of destroying the dead plants or allowing them to stand in the field. *Rhizoctonia bataticola* has also been found on tea affected by wood rot and shot-hole borers, by *Calotermes*, and by scavenging termites.

As has been said already, investigation is required into the parasitism of the *Rhizoctonia*, but there is also required a study of the physiology of the root systems of tea and other plants with special reference to soil moisture, aeration and acidity, to the effects on their roots of the above-ground treatment of the plants, for example, the pruning of tea, and to changes in their cell-sap during periods of growth, all or any of which studies may prove to throw light on the reasons for the susceptibility, immunity or resistance of the individual plant or species to root disease in general and *Rhizoctonia* disease in particular.