

SECTION VI

FUNGUS DISEASES AND GREEN MANURING

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A consideration of fungus diseases and green manuring falls roughly into two main heads, firstly, of green manure crops and their relation to diseases of the main crop plants and, secondly, of diseases of the green manure crops themselves. It must be borne in mind that, provided that diseases of green manure plants are not of a severity sufficient to prevent them functioning as such and provided that such diseases are not passed on to the main crop plants for the benefit of which the green manure plants are grown, the diseases of green manure plants are of relatively little importance. It is possible that the perusal of a list of diseases of certain groups of plants might give the impression that such plants are often and severely attacked by disease and that their presence may constitute a danger. It would be as well, therefore, to point out at the beginning of this section that the value of green manuring is so great as to warrant amply the adoption of measures to control serious diseases of the green manure plants and to prevent the main crop plants from suffering unduly from disease as a consequence of their presence. Such measures must be, of necessity, simple and inexpensive. If one form of green manure plant is found to be unsatisfactory on account of disease it is often possible to replace it with another plant equally satisfactory as a green manure and less susceptible to the disease in question.

It is proposed to consider chiefly green manures and their relation to disease in the main crop plants in which they are grown and to give brief notes only on the diseases of the green manures themselves.

1. GREEN MANURES AND THEIR RELATION TO DISEASE OF ECONOMIC CROPS

Root Disease.—All woody plants are susceptible to root disease and green manure trees and shade trees are no exception to this rule. The extent of attack and the rapidity of death after attack vary in different plants and under different conditions. Generally speaking, root

diseases flourish in damp situations and in good soils and kill with greater rapidity trees with soft, easily penetrated roots. The common fungi associated with root disease such as *Fomes lignosus*, *Fomes lamarckii*, *Poria hypolateritia* and *Rhizoctonia bataticola* are known to occur on a great variety of host plants although there seems to be a certain preferential association of certain plants and certain root diseases, for instance, *Hevea* and *Fomes lignosus*, tea and *Poria hypolateritia*, and Cacao and *Fomes lamarckii*. This may not be so much a question of individual susceptibility as of conditions prevailing which are most favourable for the development and parasitism of individual fungi. There is no indication of unusual susceptibility to root disease in any of the green manure and shade trees commonly grown in Ceylon while, as far as is known, none of them are immune.

It is, therefore, obvious that, while they are growing, green manure and shade trees do not constitute a danger, as far as root disease is concerned, to the crop plants in which they are grown. It has been the practice, however, to cut out such trees periodically for firewood, or when the trees become inconveniently large; if the stumps and roots are left in the ground then the root disease question assumes a greater importance. Petch⁽¹⁾ has pointed this out and says:

“In old tea, the chief source of root disease lies in the stumps of shade trees which have been felled. *Grevillea robusta* is a notorious offender in this respect, and its stumps very frequently give rise to *Ustilina*, or, more rarely, to Brown Root disease. When *Grevilleas* have to be got rid of, their stumps should be dug out. *Jak* (*Artocarpus integrifolia*) and *Dadap* (*Erythrina lithosperma*) have been found to serve as a starting-point for *Fomes lignosus*. *Albizzia moluccana* is one of the most difficult shade trees to deal with in connection with root diseases, and one is inclined to recommend that it should never be planted through tea. Owing to its rapid growth, it usually gets out of hand in a few years, and, in certain of the low-country districts of Ceylon, trees with trunks 4 feet in diameter were formerly not uncommon in tea. When cut down, its stumps very generally afford a place of origin for *Ustilina*, *Diplodia*, and *Poria*, and large numbers of bushes are killed out round them. With regard to these common shade, or green manure, trees of tea, it might almost be said that from their stumps root disease is the rule rather than the exception.”

The same applies to stumps of green manures or shade trees when left in the soil among other woody crops, such as cacao or rubber. The reason why deaths from root disease

should occur round stumps is not quite clear. Butler⁽²⁾ in his report on diseases of tea in Nyasaland states:

“As the stumps decay, patches of dying tea are noticed around them, and these may continue to expand for a considerable period unless arrested. I have not seen an adequate explanation of this phenomenon, through the immediate cause of the death of the bushes—the action of certain parasitic fungi which attack the root—is well known. How it is that these fungi require the presence of decaying wood, usually in large masses, to start them into activity is obscure.”

A possible explanation is that the air-borne spores of the root disease fungi find in the decaying stumps conditions most favourable for their germination and development.

Danger from root disease caused in this way can be avoided by removing the stumps when felling green manure trees. When the trees have been allowed to grow to a considerable size this is a difficult and costly operation. The modern tendency in estate practice is to remove shade trees before they become large enough to be troublesome. This is particularly applicable to albizzias and dadaps at low and mid-country elevations. Sometimes, when trees, e.g., grevilleas, are grown for firewood in addition, it is more practicable to leave them longer and to exert care in removal. In this connection it is perhaps worthy of note that certain ‘tree-killers’ are on the market, the proprietors of which claim that the roots of trees killed by them are impregnated with poison and in consequence do not harbour parasitic fungi. A ‘tree-killer’ is being tested now; so far results show that trees to which the poison is applied die more quickly than those which are ringed in the usual way, but a considerable period of time must elapse before any useful data can be obtained on the effect on the roots. If the claims are substantiated the danger of root disease originating from stumps and roots left in the ground will be lessened by using the ‘tree-killer’.

In addition to the green manure and shade trees there are erect covers such as *Tephrosia candida* and *Crotalaria* spp. which become woody with age and, when woody, may be attacked by the common root diseases. Green manure plants of this type are lopped periodically and after about two years branches may die back and act to a lesser degree in a manner similar to the stumps referred to above. *Tephrosia candida*, if left too long, is susceptible to a root disease caused by *Irpex subvinosus* which from this source has been known to pass to and attack tea. Erect green manure plants should therefore be removed

and replanted periodically. The stumps must be removed completely—an operation not very difficult if two years is the limit of time they are allowed to grow.

Green manures have yet another bearing on the incidence of root disease in woody crop plants. Murray ⁽³⁾ pointed out that a thick cover of vigna (*Dolichos Hosei*) produces conditions favourable for the rapid spread of *Fomes lignosus* in rubber. Although vigna is not attacked by the fungus, the moist conditions prevailing under the cover produced by the plant favour the activity of the fungus, while the older runners of the plant act as convenient footholds for the strands of mycelium which pass along them. Similar conditions occur when other cover crops are grown, and cover plants when allowed to grow up the base of trees may conceal fructifications or decaying tissue and thus aid the spread of root disease by preventing prompt treatment. A sound recommendation is that the cover plants should be cleared away to a distance of about 3 feet from the base of the trees. In addition to this, where root disease occurs, the area containing affected and suspected trees should be completely cleared and kept clean weeded; isolation trenches should be kept clear of cover plants.

There remains a consideration of green manures and their relation to root disease in herbaceous plants. It is unusual for green manure plants to be grown simultaneously with herbaceous crops, but it is a common practice to turn in leguminous or other green manure plants prior to growing the main crop. Gadd and Bertus ⁽⁴⁾ noted the occurrence of *Rhizoctonia Solani* (*Corticium vagum*) on vigna and other cover plants and showed by experiment that the fungus was capable of attacking a very large range of plants in the seedling stage. Weir ⁽⁵⁾ drew attention to diseases of cover crops grown under rubber in Malaya caused by *Rhizoctonia Solani*, *Sclerotium Rolfsii* and *Pythium* sp. The two former are sclerotial fungi and produce resting bodies or sclerotia which are capable of germinating in soil after long periods. The presence of these fungi on the green manure plants and the subsequent infection of the soil when the green manure plants are mulched into the soil might lead to heavy losses of main crop plants soon after germination. It should be pointed out that not only do these fungi attack and kill herbaceous plants such as tobacco, brinjal and chilli, but they are parasitic on young seedlings of tea and rubber and other plants which subsequently become woody. The need for eradication of diseases of the cover crops as soon as they appear and the need for care in avoiding infection of the soil by this type of fungus is therefore of importance. The question of control will be considered later in the notes on the diseases of green manure plants.

Although certain parasitic fungi may be introduced into the soil in green manuring this infection can be avoided with a little care. It is possible that with certain diseases actual benefit may be derived from green manuring in the suppression of disease. Millard and Taylor ⁽⁶⁾ have shown that the prevalence of potato scab (*Actinomyces scabies*) is decreased by green manuring. They suggested that green manuring may encourage the growth of saprophytic organisms with the result that parasitic organisms are suppressed. It will not be out of place to state again that the benefits derived from green manuring are such as to justify amply the adoption of a little care in controlling any root diseases that might be encouraged by, or introduced in, the process.

Stem diseases.—There are two stem diseases of woody green manure plants which also attack main crop plants in Ceylon. Pink disease (*Corticium salmonicolor*) has been recorded on *Gliricidia maculata*, *Crotalaria* spp. and *Desmodium heterocarpum*, while the alga, *Cephaleuros parasiticus*, has been found to attack boga (*Tephrosia candida*). The former of these diseases has been known on tea and rubber although on neither is it a serious disease in Ceylon, while red rust is common on tea and has occurred on cinnamon, coffee, and rubber. There is no indication that green manure plants are more susceptible to these diseases than the main crop plants on which they have been known to occur and their eradication from the green manure plants is relatively simple.

It is possible that the presence of cover crops may affect the incidence of certain stem diseases of the trees under which they are grown by increasing the humidity of the atmosphere. There is no record of the increase of such diseases as bark rot or stem canker of rubber where cover crops are grown, but diseases of this type are favoured by humid conditions and it is conceivable that a thick cover of vigna or some similar green manure plant might, by increasing the humidity, tend to increase the incidence of these diseases. This is, however, unlikely ever to become important in Ceylon where effective preventive application of disinfectants is the common practice.

Leaf disease.—It is in connection with leaf disease that the planting of certain green manure trees affects intimately the incidence of disease in the crop plant. *Cercospora Theae* is considered to be the most serious disease of tea grown in a wet climate at high elevations. The incidence of this disease is directly correlated with the growth of certain shade trees, particularly of *Acacia decurrens*, under such conditions. Petch (*loc. cit.*) showed that the disease first attacks acacias and spreads from them to the tea. He pointed out that, usually, the disease

occurs on tea interplanted with *Acacia decurrens*, but that it also attacks *Acacia dealbata*, *Acacia melanoxylon*, karri (*Eucalyptus diversicolor*), and red gum (*Eucalyptus robusta*). Gadd ⁽⁷⁾ extended the host range of *Cercospora* by including *Albizzia lophantha*. Petch (*loc. cit.*) described the progress of the disease thus:

“When *Acacia decurrens* is attacked, the trees are defoliated, the leaflets and the leaf-stalk, or rachis, falling separately. The smaller branches may die back, and young plants may be killed, but, in general, the trees put out new foliage when drier weather supervenes.

“The disease is conveyed from the Acacias to the tea, either by means of its spores which are blown by the wind, or washed by the rain, on to the surrounding bushes, or by the falling leaflets of the *Acacia*. As the leaflets are small and flat, they adhere, when moist, to the leaves of the tea bush long enough to enable the fungus to grow from them to the tea leaf. It is easy to find in an affected field numerous instances in which an *Acacia* leaflet is attached to a tea leaf by a web of mycelium in the middle of a diseased patch, and others in which a spot is beginning to form from a similarly attached leaflet. In general, it would appear that the smaller circular spots are the result of an infection by spores, while the larger patches are due to the transference of the fungus by means of the falling *Acacia* leaflets, but that is not universally the case. Naturally, when the disease is transferred by a leaflet, the mycelium is superficial on the tea leaf from the beginning of formation of the spot.”

The disease occurs only in the areas of tea which are subject to conditions of high humidity and particularly in those areas where mists are prevalent. Areas of tea which are not in the ‘mist zone’ but which get the same amount of rainfall as those nearby but within the ‘mist zone’ are not affected to nearly the same extent as the latter. It is obvious, therefore, that the areas of tea in Ceylon which are subject to severe attacks of *Cercospora* are not very great. It is unfortunate that, at the elevation at which the disease is most severe, the number of shade and green manure trees which grow satisfactorily is extremely limited and that, of these, *Acacia* is certainly the best. Whether it is advisable to cut out the acacias in those areas in which the disease occurs is a question which must be dealt with in the light of experience on each estate. In some instances it will be found that the damage caused by the disease more than balances the benefit obtained in green manuring and shade from the acacias. From such areas the trees should be removed. The disease occurs during definite seasons and it might be possible to avoid serious infection by lopping the acacias prior to

those seasons. Meanwhile, endeavours should be made to find a green manure and shade tree immune to *Cercospora* which could replace the acacias.

There are no other leaf diseases of economic plants which have been shown to be correlated in any way with the presence of green manure plants. It should be pointed out, however, that *Centrosema pubescens* is attacked by an *Oidium* which is similar in morphological characters to that which attacks *Hevea*. It is not possible to state if it is the same species nor has the fungus been proved to be capable of attacking *Hevea*. Even if it were, it is unlikely that the presence of the fungus on the cover crop would affect the severity of attack on *Hevea* since, in those areas in which *Oidium* occurs on rubber, the fungus is usually present to such an extent on the rubber that its occurrence on the cover crop would make little difference.

2. DISEASES OF GREEN MANURE PLANTS

A large number of diseases of green manure plants have been recorded in Ceylon, but with very few exceptions, they do not constitute a limiting factor to the growth of these plants. Certain diseases, however, have proved to be troublesome and for that reason are dealt with at some length below:

Sclerotial diseases of cover crops.—The two chief organisms causing diseases under this head are *Rhizoctonia (Corticium) Solani* and *Sclerotium Rolfsii* and of these the former has proved to be much more common on estates in Ceylon. Wier (*loc. cit.*) has reported *Rhizoctonia Solani* on *Calopogonium* and vigna in Malaya, while in Ceylon it is common on vigna, cowpea and *Dunbaria Heynei*.

The effects of the two diseases are somewhat similar. Brown and roughly circular patches occur in the cover ranging in diameter from a few inches up to several yards. These patches are particularly noticeable in areas in which the cover is well grown, since affected areas are somewhat sunken below the general level of the cover. Outbreaks occur most commonly during wet weather. The two diseases differ when examined closely and are therefore described separately.

Rhizoctonia (Corticium) Solani.—On a close examination of a patch of vigna attacked by *Rhizoctonia (Corticium) Solani* the majority of the leaves, particularly of the lower ones, may be seen to be rotting and bound together by wefts of cobweb-like mycelium which can be traced readily on most of the affected leaves and stems. Loosely attached to diseased stems and leaves near the ground are found the sclerotia or resting bodies of the fungus. In appearance sclerotia are not unlike

fine gravel or small soil fragments and range in size from 0.5 to 4 mm. in diameter. Sclerotia are very resistant to adverse conditions and serve to tide the fungus over periods of drought and, being but loosely attached, they are readily dropped into the soil. By these the fungus is carried over from wet season to wet season.

The perfect (*Corticium*) stage of the fungus has been observed but rarely on vigna in Ceylon. It occurs on green stems and on the under surface of green leaves in, or adjacent to, affected areas as a white or greyish powdery layer. This layer can be removed entirely with the point of a needle and consists of a basal network of loosely woven hyphae from which spring basidia on the apex of each of which are borne four hyaline, oval, apiculate spores. It is interesting to note that the leaves on which this stage of the fungus is formed are not injured by the fungus and appear to act merely as supporting surfaces for the spore-bearing mycelium. The spores measure 7-12 by 4-6 microns.

Sclerotium Rolfsii.—*Sclerotium Rolfsii* has been recorded in Ceylon on vigna and *Crotalaria* but is common on neither. It is, however, common in tropical and sub-tropical regions and may cause serious losses of herbaceous garden and field crops. Bertus⁽⁸⁾ has written a full account of its occurrence in Ceylon and has shown that it is capable of attacking a wide range of herbaceous plants. The growth of the fungus on infected plants is characteristic. Strands of white mycelium occur on affected stems and these on reaching the leaves may spread into silky fan-shaped growths of hyphae. Attached lightly to the mycelium and to dead stems and leaves are found sclerotia which are at first white and then yellow-brown, spherical, smooth and shining and 1-1.5 mm. in diameter, similar in appearance to mustard seed. The functions of these sclerotia are as described above and these again are capable of remaining viable for long periods under dry conditions. No perfect or spore-bearing stage of *Sclerotium Rolfsii* has been observed.

Treatment.—The ideal control measure for all soil-inhabiting parasitic organisms is that of soil sterilisation. This, however, is impracticable under field conditions. It is essential that measures for the control of diseases of green manure plants in general should be cheap and efficacious. In Malaya, Weir (*loc. cit.*) has recommended the isolation of patches affected by these fungi by means of a trench 18 inches deep and the treatment of the enclosed area with a soil fungicide. He points out that fungi of the type under discussion do not penetrate the soil to any great depth and emphasizes the need of keeping the trenches clear.

In Ceylon, the general recommendation is the collection of all affected plants within an area, together with a border of apparently healthy plants—a border 3 feet wide all round the patch should suffice. It is important that the plants collected should be burned within the patch if possible and the surface soil of the patch should be scraped lightly together and heated by the fire in order to kill the sclerotia of the parasite which have fallen on it. If burning within the area is impracticable the dead plants, together with the soil scrapings, should be taken away in tins or some similar receptacles since there is otherwise a danger of dropping sclerotia and infecting other areas during the transportation to the place of destruction. Treated patches should be kept clean for a period of at least one year.

In those areas in which the burning of diseased plants *in situ* is not practicable, the recommendation made in Malaya of applying disinfectants might be adopted. The ground should be cleared as above and a liberal application (1 quart per square foot) made of a two per cent solution of formalin, a one per cent solution of blue vitriol (copper sulphate) or Jeyes' fluid at the rate of 1 ounce Jeyes' fluid to one gallon of water.

Dying back of shade and green manure trees.—From time to time numerous requests for advice have been received concerning the dying back of certain shade and green manure trees—particularly of dadaps and grevilleas. That such trouble is wide-spread was made clear by the answers to the questionnaire on green manuring recently circulated to estates in Ceylon. The diseases of dadaps and grevilleas are distinct and are discussed briefly below.

Dadap.—There are two diseases of dadap which result in dying back. One is caused by *Fusarium* sp. and has been described by the writer ⁽⁹⁾, while the other results from eelworm injury in the roots and has been described by Gadd ⁽¹⁰⁾.

Fusarium die-back.—The disease occurs after lopping. Green-brown or olive water-soaked blisters appear on the cortex of lopped branches and as the disease advances these may amalgamate and finally dry out to become characteristic sunken areas of dead cortex, brown in colour. The lenticels of the area affected develop pinkish-white pustules of spores of the causal fungus. The disease is most active in wet weather and occurs in the Uva district and, to a lesser extent, in other up-country districts. When grown in situations favourable for their growth, young vigorous trees are not affected seriously by the disease. Old trees, after repeated loppings, and trees in exposed situations and grown under unfavourable conditions may suffer extensively, while the time of lopping appears to influence the severity of attack.

The dadap, like certain other trees used for the same purpose, has a limited economic life since after repeated loppings it becomes increasingly susceptible to disease. The common estate practice is to replant when trees become unthrifty. The age at which trees should be removed and replanted varies in different districts but usually lies between ten and fifteen years. The replanting of dadaps as soon as they begin to show symptoms of degeneration and increasing susceptibility to disease, and lopping only at times when the trees are at the beginning of a period of vigorous growth, i.e., when the sap is running, will tend to minimise the possibility of extensive *Fusarium* die-back.

Eelworm disease.—Eelworm disease of dadap is common in certain districts in Ceylon, particularly Maskeliya, at an elevation above 4,000 feet. Affected trees show poor growth, the leaves being undersized, pale in colour and few in number. Lower leaves fall off prematurely and in advanced cases branches die back, the trees having, in consequence, a thin and unthrifty appearance. The most typical symptom is the crowded state of the leaf scars on the shoots of affected trees, which is the result of suppression of normal growth followed by defoliation. An examination of the roots of such trees shows galls typical of nematode infestation in both large and small roots. The galls vary in size and are easily distinguishable from the nodules caused by nitrogen-fixing bacteria which are more or less spherical, easily detached and present only on the smaller roots. Eelworm galls are enlargements of the roots themselves and when cut open the female nematodes may be seen as glistening white or pearly white, rounded, pear-shaped bodies about half the size of a pin's head. The general effect of the root infestation is the lowering of the vitality of the trees and the consequent increase in susceptibility to fungus attack and to unfavourable conditions.

The eelworm is known as a serious parasite of tea seedlings and has been known to attack roots of old tea, although not commonly. Dadaps affected by eelworms should therefore be treated. No satisfactory method other than some form of soil sterilisation has been evolved for the control of eelworm. In areas in which eelworm disease occurs dadaps should be removed as completely as possible and the roots burned and some other form of shade or green manure tree established.

Grevillea.—The elevation to which grevilleas can be grown in Ceylon is limited and as the upper limit is approached a die-back is common on trees of over ten years of age. That this die-back is affected by adverse conditions is shown where exposed trees on poor soil exhibit the die-back symptoms, while

older trees in the same or adjoining fields, grown under more favourable conditions, do not exhibit the symptoms. Trees die from the top slowly and a close examination of the portions dying back and of the roots fails to disclose any parasitic fungus. As the die-back advances it may be accompanied by a gummosis, the bark cracking vertically and gum exuding; in extreme cases the trees die and an examination of the roots reveals the presence of the fungus, *Rhizoctonia bataticola*. How far this fungus is responsible for the die-back it is impossible to say, but it is clear that unfavourable conditions, such as high elevation, exposure and poor soil render trees over a certain age susceptible to this form of die-back. There appears to be no difficulty in re-establishing young trees in these areas and the common estate practice in Ceylon is to replant grevilleas when they first show indications of this degeneration and to use the timber of the older trees for firewood.

The die-back of mature grevilleas planted at elevations over 5,000 feet should not be confused with a superficially similar die-back caused by *Calotermes Greeni* which is referred to elsewhere.

The African or Kalutara Snail (Achatina fulica).—In rubber growing districts in Ceylon the African or Kalutara Snail has done extensive damage to cover crops by eating green leaves and stems. On some estates damage has been so severe as to constitute a limiting factor to the establishing and growth of such covers as vigna and the interest of the planting community has been roused. The snail is very common and, as most of the depredations take place at night, the presence of large numbers of snails escapes notice since they hide under stones, etc., during the day. Although attention has been directed to the problem of controlling the pest no satisfactory control has so far been evolved. Short notes are given below on methods of control which have been suggested.

Predatory animals.—A number of animals eat the Kalutara snail and it has been suggested that endeavours be made to increase their numbers. A number of birds eat the young snails and the ruddy mongoose is said to feed on the snails extensively. None of these, however, feeds solely upon the snail nor is it likely that any form of protection or measures that might result in an increase in their numbers would be of material benefit, while there is always the possibility that such measures might result in overwhelming disadvantages in other directions. Hutson and Austin ⁽¹¹⁾ drew attention to the possible value of the Indian glow-worm (*Lamprophorus tenebrosus*) in controlling the snail, but the experience of several years indicates that the insect breeds too slowly to effect efficient control.

Collection.—Hand collection of the snails is one of the most popular methods of control. Very large numbers can be collected but figures taken over a long period do not indicate that such collection is likely ever to result in a marked diminution of numbers and an efficient control. Collected snails are destroyed by pouring boiling water over them or by burying them in a deep pit with unslaked lime.

Use of poisons.—Poisons have been used in two ways, by spraying the cover with a poison and by applying a poison mixed with lime to rocks, etc., throughout the infected area. In the former method, the cover is sprayed with a solution of copper sulphate or with Bordeaux mixture. This appears to give satisfactory results but the expense and the necessity of repeated applications tend to render it impracticable.

The use of a poison such as the "Atlas" poison mixed with limewash and applied to the under surface of rocks and stones has been tested under estate conditions. Reports of results are somewhat contradictory; some estate superintendents have stated that this treatment is effective, while others have reviewed results unfavourably. It is difficult to estimate the number of snails killed by the treatment since the number of empty shells is the only indication of the number of snails killed and it is conceivable that a much greater number are killed in this way than the empty shells found would indicate.

General.—Until results of experiments now in progress are available, it would appear that the best method of control of the snail pest is a combination of collection and the application of Atlas-limewash to rocks and stones.

A LIST OF DISEASES OF GREEN MANURE PLANTS IN CEYLON

Shade trees.

Acacia decurrens Willd. Black wattle.

Root diseases:

Armillaria fuscipes Petch.

Fomes applanatus Pers.

Irpex subvinosus B. & Br.

Rhizoctonia bataticola (Taub.) Butl.

Stem disease:

Nectria pulcherrima B. & Br.—Canker.

Leaf disease:

Cercospora Theae Petch.

Albizzia lophantha Benth. Cape wattle.

Root diseases:

Poria hypolateritia Berk.

Rhizoctonia bataticola (Taub.) Butl.

Leaf disease:

Cercospora Theae Petch.

Albizzia moluccana Miq.

Root diseases:

Botryodiplodia Theobromae Pat.

Fomes lucidus (Leys.) Fr.

Poria hypolateritia Berk.

Rhizoctonia bataticola (Taub.) Butl.

Ustilina zonata Lév.

Stem disease:

Nectria pulcherrima B. and Br.—Canker.

Seedling diseases:

Eelworm disease of roots (*Caconema radicolica* (Greef) Cobb.

Rhizoctonia Solani Kühn (*Corticium Solani*)—
—Sore shin.

Ceratophorum Albizziae Petch.—Sore shin on
leaves.

Erythrina lithosperma Bl. Dadap.

Root diseases:

Fomes lamaoensis Murr.—Brown root
disease.

Fomes lignosus Klotzsch.

Poria hypobrunnea Petch.

Rhizoctonia bataticola (Taub.) Butl.

Ustilina zonata Lév.

Caconema radicolica (Greef) Cobb.—Eelworm
disease.

Stem diseases:

Botryodiplodia Theobromae Pat.

Fusarium sp.—Die-back.

Phyllosticta Erythrinae Petch.

Leaf diseases:

Coleosporium Erythrinae Petch.

Phyllosticta Erythrinae Petch.

Hendersonia obesa Petch.—Leaf spot.

Eucalyptus spp.

Root Disease:

Rhizoctonia bataticola (Taub.) Butl.

Leaf diseases:

Cercospora Theae Petch.*Pestalozzia disseminata* Thuem.*Stictis emarginata* Cke. & Mass.

Seedling disease:

Rhizoctonia sp.—Collar rot.*Gliricidia maculata* H.B.K.

Root Diseases:

Fomes lamaoensis Murr.—Brown root disease.*Sphaerostilbe repens* B. & Br.*Ustilina zonata* Lév.

Stem disease:

Corticium salmonicolor B. & Br.—Pink disease*Grevillea robusta* A. Cunn. Silky oak.

Root Diseases:

Botryodiplodia Theobromae Pat.*Fomes lamaoensis* Murr.—Brown root disease.*Rhizoctonia bataticola* (Taub.) Butl.*Ustilina zonata* Lév.

Seedling disease:

Rhizoctonia bataticola (Taub.) Butl.—Collar rot.*Leucaena glauca* Benth.

Root disease:

Poria hypobrunnea Petch.

Green manure plants.

Clitoria cajanifolia Benth.

Root disease:

Rhizoctonia bataticola (Taub.) Butl.*Crotalaria* spp.

Root disease:

Rhizoctonia bataticola (Taub.) Butl.

Stem disease:

Sclerotium Rolfsii Sacc.

Leaf diseases:

Cercospora Crotalariae Sacc.
Colletotrichum Crotalariae Petch.
Parodiella grammodes Kze.
Phyllosticta Crotalariae Sacc.
Sphaerella Crotalariae Petch.

Tephrosia candida DC. Boga medeloa.

Root diseases:

Fomes lamaoensis Murr.—Brown root disease
Irpex subvinosus (B. & Br.) Petch.
Poria hypobrunnea Petch.
Rhizoctonia bataticola (Taub.) Butl.
Rosellinia arcuata Petch.

Cover crops.

Centrosema pubescens Benth.

Leaf disease:

Oidium sp.—Mildew.

Desmodium heterocarpum DC.

Root disease:

Rhizoctonia bataticola (Taub.) Butl.

Stem disease:

Corticium salmonicolor B. & Br.—Pink disease

Dolichos Hosei Craib (*Vigna oligosperma*)

Root, stem and leaf diseases:

Rhizoctonia Solani Kühn (*Corticium Solani*)
Sclerotium Rolfsii Sacc.

Leaf disease:

Uromyces (?) sp.—Rust.

Dunbaria Heynei W. & A.

Root and stem diseases:

Rhizoctonia Solani Kühn (*Corticium Solani*)

Vigna catiang Walp. var. *sinensis* Endl.—Cowpea.

Root and stem disease:

Rhizoctonia Solani Kühn (*Corticium Solani*)

Leaf disease:

Uromyces appendiculatus (Pers.) Link.—
 Rust.

The above list is by no means complete and has been compiled from the records of the Mycological Division and from Bulletin 83⁽¹²⁾. The specimens examined in the course of routine advisory work may, however, be assumed to have given a fairly comprehensive list of the more serious diseases of the green manure plants in Ceylon with the exception of those only recently introduced from other countries.

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