Plate II.—Stem girdling and callus formation of Arabica coffee caused by *Corticium salmonicolor.*

Occasionally the sexual stage of the fungus will form on the pink crust, but the spores are colourless and very small and cannot be detected on the crust with the naked eye. These spores can be wind-borne, however, and therefore constitute a source of inoculum for new infections at a distance. Often, however, the crust is sterile.

Occasionally the asexual spore form (once thought to be another fungus called *Necator decretus*) forms on the branches on the opposite side of the crust, i.e., on the upper side exposed to bright light. The spores occur in pustules which resemble orange pin heads, protruding through the bark. These spores are not wind-blown but are carried by water. In the Territory the "Necator" stage has only been recorded on coffee at elevations over 4,500 feet.

Branches infected with Pink Disease should be cut out and burnt. Because of the slow rate of growth of this fungus, outbreaks should be easily noted and brought under control before much damage occurs. Spraying with Bordeaux Mixture or other copper fungicides in cases of multiple infection has given good results. Heavy shade increases humidity which favours the fungus, so judicious thinning might be necessary.

As well as the economic plants mentioned above as hosts to this fungus, the following common shade plants and ornamentals are susceptible :

Crotalaria anagyroides, Cajanus cajan (pigeon pea), *Tephrosia candida, Eryobotrya japonica* (loquat), *Grevillea robusta* (silky oak), *Cordyline* spp. and *Justicea gendarussa,* the common hedge plant.

It will be noted that many of the above, and citrus, are grown in and around coffee plantations, and every care should be taken to eradicate the disease on these plants, otherwise they will provide inoculum for the coffee.

The disease occurs in both Arabica and Robusta coffee in the Territory.

LEAF AND BERRY SPOT.

(Caused by *Cercospora coffeicola* Berk & Cooke)

This fungus produces white circular spots with a brown margin on leaves, often surrounded by a slight yellow halo. With a hand lens a few minute black points can sometimes be noticed in the white centre. The fungus can

Plate III.—Leaf spot caused by *Cercospora coffeicola.*

Plate IV.—Thread blight caused by *Pellicularia koleroga.*

also attack berries, causing small brown blotches, sometimes depressed, which can spread and damage the whole berry. Occasionally the minute black pin points can also be seen on the berry lesions. The black pin points are seen under the microscope to consist of small clumps of light brown fungal stalks on which are borne the numerous spores of the fungus.

The disease causes very little damage in healthy coffee, but if leaves are yellowish through over-exposure or nitrogen deficiency, the leaf spots will increase. If seedlings are attacked in the nursery, the disease can also build up and defoliation and dieback can occur.

Control measures are usually not required for this disease, especially if shade management is satisfactory and the coffee is not showing any deficiency symptoms, but if seedlings are attacked in the nursery, spraying with copper fungicides will be found efficaceous.

In the Territory this disease is rarely found on Robusta coffee, but occurs to a small extent on most Arabica coffee in the Highlands, although it seldom builds up on leaves or berries to any degree.

THREAD BLIGHT.

(Caused by *Pellicularia koleroga* Cooke)

This fungus, which was once known as *Corticium koleroga,* grows on the undersurface of leaves and fruits. It appears first as a fine

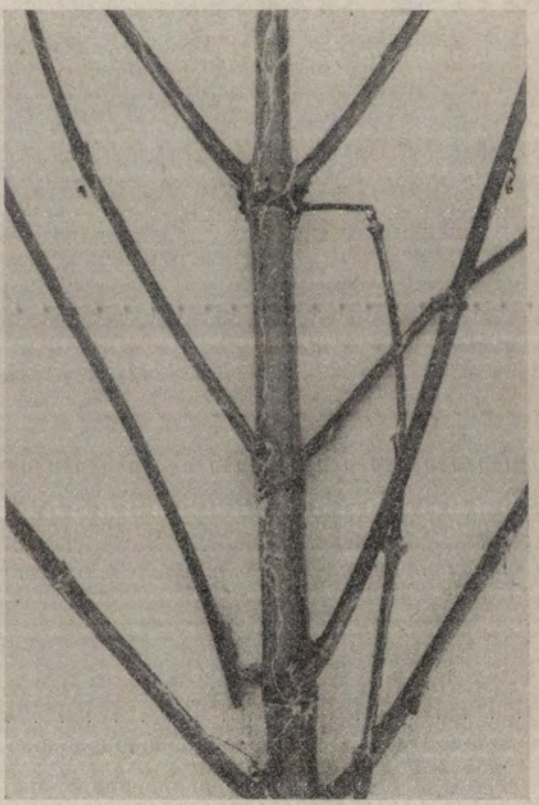

Plate V.—White thread blight of Robusta coffee.

silvery web, and causes a black rot of leaf or stem tissues. At a later stage, the fungus appears as light brown strands spreading over the undersurface of the leaf, running along the petioles and down the stems. The petiole dies and the leaf would fall from the tree except that it usually remains hanging vertically attached to the branch by the fungal threads or pellicle.

The fungus prefers warm, moist conditions, and is therefore usually found in the Territory on Robusta coffee in the lowlands in the wet season or in plantations under heavy shade.

The disease can be controlled by judicious shade management and by cutting out and burning infected branches. Chemical control is usually not warranted in a well run plantation.

WHITE THREAD BLIGHT.

White thread blights occasionally occur on Robusta coffee in the Territory, but are never serious. The fungi causing white thread blights are usually species of *Marasmius* or *Corticium*—the genus cannot be identified unless the spores are present, and to date no spores have occurred on the few Territory collections available for examination.

The disease can be controlled by reducing humidity by careful thinning of shade and by cutting out infected branches and burning.

ROOT ROT.

A few specimens of root rot have been reported in the Territory, but to date all the specimens have lacked fruiting bodies which are necessary for the identification of the fungi.

If a tree wilts and dies, the collar, taproot and laterals should be dug out, and inspected for signs of broken bark (perhaps caused by crickets on the stems and cockchafer larvae on the roots) or other signs of insect damage. If injury by insects is not applicable, inspect the roots and collar for fungal threads, strands, sheaths, or crusts. These might be white, grey brown or black or sometimes other colours. Occasionally, however, it is difficult to detect the fungus externally. The collar and taproot should be split once longitudinally and the two newly-exposed faces examined for signs of rot (change of colour of the wood, change of texture, collapse of tissue) or the presence of black fungal lines in the wood.

If root rot is determined, the laterals should be dug out and all material burnt, so that the fungus will not spread in the ground along the diseased roots.

If root rot is suspected, the taproot and collar cut off about one foot above soil level can be forwarded to Headquarters for examination.

SOOTY MOULDS.

Sooty moulds occur commonly on Territory coffee, particularly on Robusta. The sooty moulds include many species of fungi, all with dark coloured fungal threads, which are superficial on the leaf surface, attached to the leaf cuticle by tiny pegs or holdfasts or which send

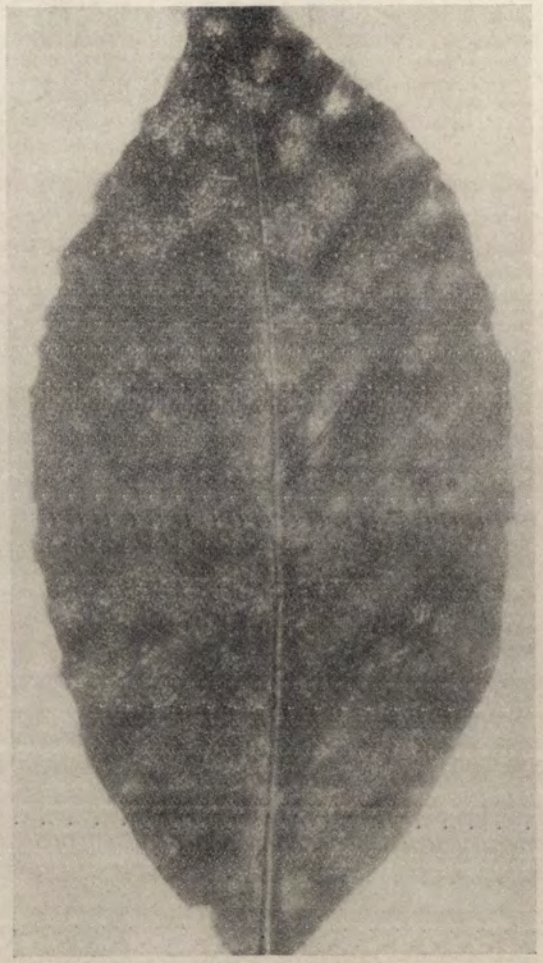

Plate VI.—Lichen colonies on upper surface of Arabica coffee leaf.

haustoria or feeding organs into the host tissues The sexual fruiting stages consist of spherical black bodies containing the spores, but they are so small that they cannot be seen with the naked eye.

The large group which is quite superficial on leaves lives mostly on honeydew or excretions of aphids and scale insects.

The sooty moulds are of no economic importance.

LICHENS.

Coffee leaves bearing colonies of lichens are often received for identification, being suspected of causing disease. However, they are quite superficial on the leaves and cause no damage whatsoever.

The lichens on coffee leaves resemble small white circular crusts from 1-3 mm. in diameter. They can be easily removed from the leaves with the fingernail, a match, or knife blade, without any damage to the underlying tissue.

Plate VII.—Overexposure dieback of Arabica coffee.

A lichen colony consists of a fungus and alga (many different species) growing symbiotically, and because both prefer humid conditions, the colonies are usually most abundant in heavily shaded plantations or near the protected basal leaves of the plant. They are of no importance themselves but their abundance can be taken as an indication that humidity is very high and discreet thinning of shade might be desirable.

OVER-EXPOSURE DIEBACK.

In those plantations where shade is deficient and cloud cover is inadequate, dieback of tips of branches, particularly of Arabica coffee, is sometimes experienced. The tips appear black and the berries do not mature. Even if the tips do not die back, berries on over-exposed

Plate VIII.—Overexposed berries with sun-scald on upper surface.

bushes are liable to sun scald. Miscellaneous saprophytic fungi can be found on the moribund tissues, but no pathogenic organism has been isolated to date. Adjustment of shade by planting rooted Leucaena cuttings or other quickly growing shade will correct the position.

EFFECT OF LOW TEMPERATURE.

Occasional low temperatures occur in the Highlands and effect the new shoots of Arabica coffee. The effect is usually not noticed until weeks later, when pairs of leaves, all about the same distance back from the tips of the branches, are found to be reduced in length and width, and with decrease in chlorophyll, giving the leaves a white look. Subsequent leaves are quite normal, and there is no effect on yield.

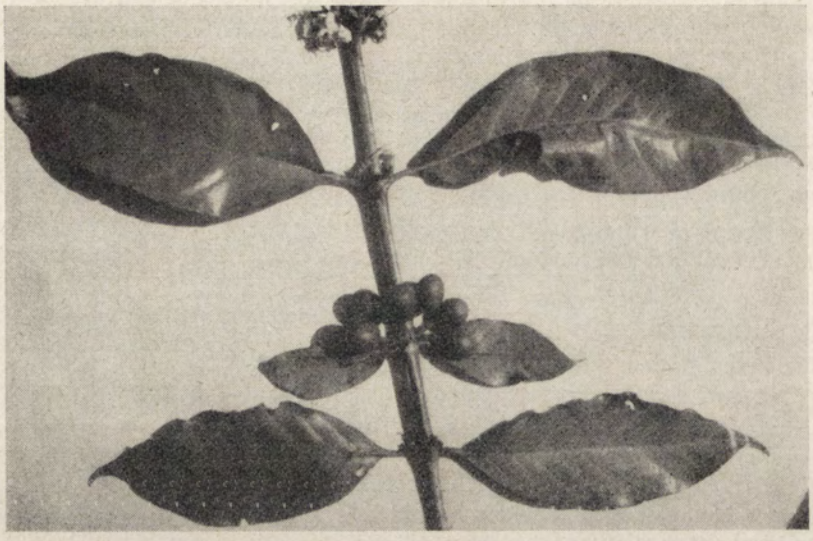

Plate IX.—Pair of small leaves on Arabica coffee, caused by low temperatures.

HORMONE WEEDICIDE DAMAGE.

Hormone weedicide damage on coffee consists of malformations of the leaves, the extent of the damage depending on the concentration of the spray and the amount falling on the leaves. The commonest effect is reduction in the size of leaves, and their tendency to be elongated or sickle-shaped. Effects of the spray may be localized on a bush, and may persist for some time. To date no damage has been observed on the fruit, and no changes have been noted in the colour of the tissues.

DISEASES CAUSED BY SOIL DEFICIENCIES.

Dieback, malformed leaves and other abnormalities of coffee caused by soil deficiencies are not featured herein.