PLANT PATHOLOGY NOTE: NO. 21

VASCULAR-STREAK DIEBACK DISEASE OF COCOA

By C. Prior, Plant Pathologist, Cocoa Industry Co. Ltd,
c/o Lowlands Agricultural Experiment Station, Keravat, E.N.B.P.

INTRODUCTION

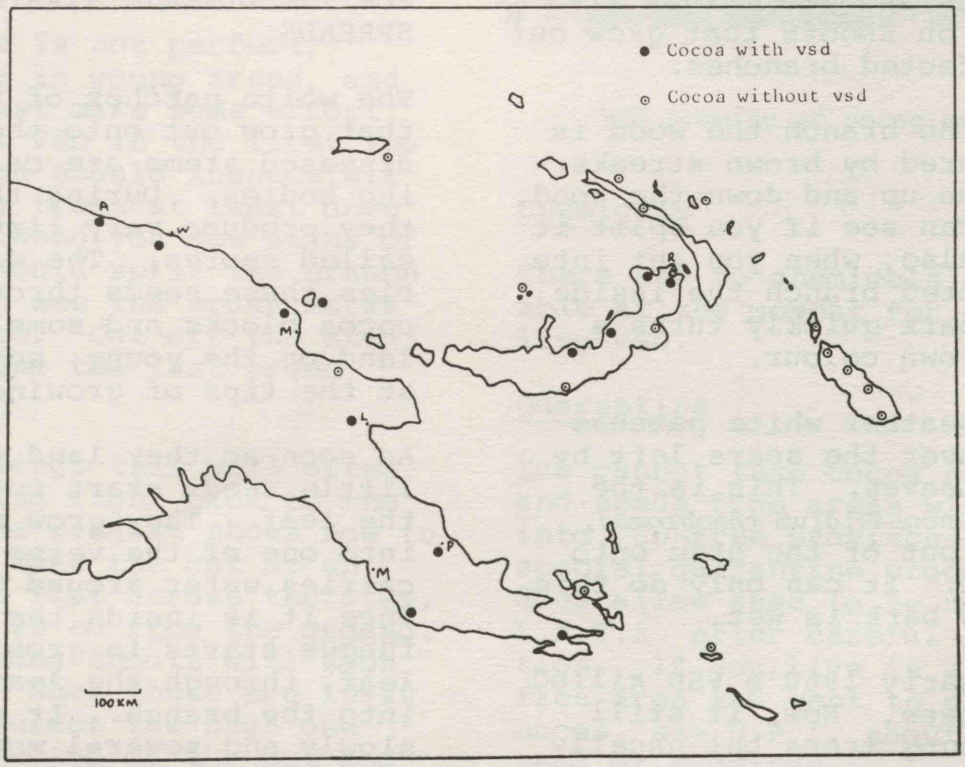
Vascular-streak dieback disease (VSD) is the most damaging disease of the shoots and branches of cocoa in Papua New Guinea. It occurs in this country and other parts of South-East Asia but not in Africa, South America or the Pacific Islands. Not all of Papua New Guinea's cocoa is affected. North Solomons, New Ireland, Manus, Bali Witu Islands and the Milne Bay Islands do not have VSD.

HISTORY

VSD probably occurred in Papua New Guinea cocoa before the war but the descriptions from that time are not clear. We are not sure if they really describe VSD.

The disease became serious in the early 1960's in East New Britain, Lae and Madang. At first no-one knew what was causing it. They suspected a fungus called *Botryodiplodia* but although they often found this fungus in diseased stems they were not able to infect healthy stems with it.

Later, a University of Papua New Guinea research worker working with D.P.I. showed that another fungus was also present in the sick stems. This



Distribution of vascular-streak dieback in Papua New Guinea

fungus had never been described before and was given the name *Oncobasidium theobromae*. This is the fungus that causes VSD.

WHAT VSD LOOKS LIKE

Only the stems of cocoa trees are damaged, though the fungus may get into the pods.

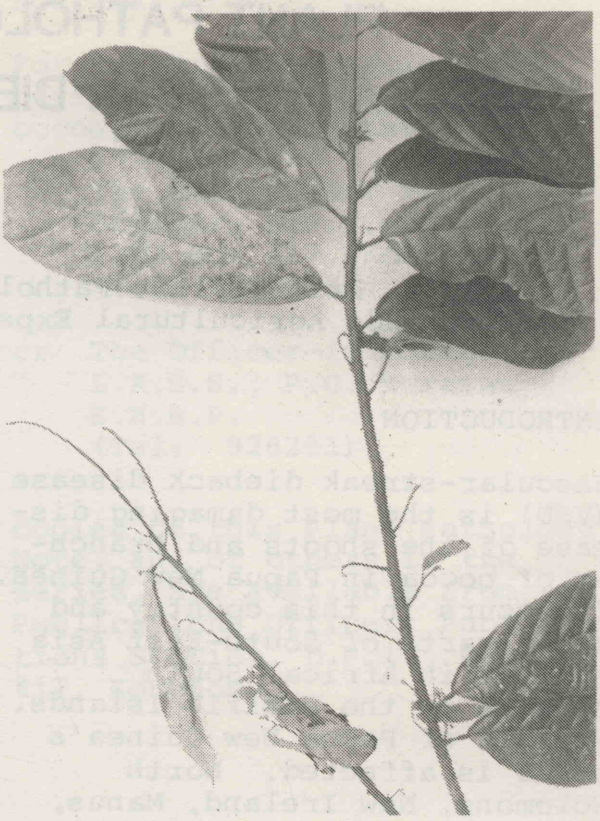
When a tree has VSD the first sign is that a single leaf in the middle of a branch, or in the middle of the stem of a seedling, goes yellow with many small green spots. It then falls off, and other leaves do the same up and down the stem. Thus the branch loses its leaves in the middle first.

The bark becomes very rough where the leaves fall off. Small shoots grow out from the buds at the base of the fallen leaves, but these shoots soon die. Eventually all the leaves fall off and the branch dies. This can take several months. Sometimes the leaves on infected branches go brown between the veins and die. This also happens on shoots that grow out from infected branches.

Inside the branch the wood is discoloured by brown streaks. These run up and down the wood, as you can see if you split it open. Also, when you cut into an infected branch the inside of the bark quickly turns a rusty-brown colour.

In wet weather white patches appear over the scars left by fallen leaves. This is the fungus *Oncobasidium theobromae*, growing out of the stem onto the bark. It can only do this when the bark is wet.

In the early 1960's VSD killed large trees. Now, it still kills young trees but usually only kills small branches on large trees.



Early and late symptoms of VSD in cocoa branches

HOW THE DISEASE STARTS AND SPREADS

The white patches of fungus that grow out onto the bark of diseased stems are called fruiting bodies. During the night they produce very tiny 'seeds' called spores. The wind carries these seeds through the cocoa blocks and some of them land on the young, soft leaves at the tips of growing branches.

As soon as they land, the little seeds start to grow into the leaf. They grow straight into one of the veins which carries water around the plant. Once it is inside the vein the fungus starts to grow down the leaf, through the leaf stem and into the branch. It grows slowly and several months pass before the branch starts to look sick. By the time the

first leaf turns yellow the fungus has been growing in the branch for three or four months. The fungus fills the wood and prevents food and water from entering the branch. Then, when the leaves start to fall from the sick branch, the fungus grows out to form new fruiting bodies.

The disease is always worse in wetter areas and in wet weather because the fruiting bodies only grow and produce seeds when the bark is wet.

HOW TO CONTROL VSD

Resistance

Some varieties of cocoa do not suffer badly from VSD. We call these resistant varieties. All the buddings that D.P.I. gives out are resistant and so are the parent trees used to produce hybrid seed. Resistance is the best way to control VSD because the grower does not have to pay for it.

Pruning

Resistance is not perfect, especially in young trees, and growers must make some effort to control VSD in the first two years. You should inspect all your young trees at least once a month. When you see signs of VSD you should split the branch or stem to see the brown marks in the wood. Cut off the stem 30 cm beyond the last brown mark.

With seedlings this will often mean cutting right back to the stump. The diagram shows how to do this. Make the cut at an angle, not flat across the stem, and about 20 cm from the ground. Several young shoots will soon grow out. When these are 10-20 cm high, select the high one nearest the top of the cut and remove the rest. This will make sure that the new shoot grows quickly over the cut and in a few months the join will be healed. If you select a shoot on the wrong (low) side of the angled cut then the cut will not heal quickly and the new shoot may break off.

Pruning should stop when the branches meet to make a complete canopy. You cannot prune effectively after this happens.

VSD pruning of young cocoa

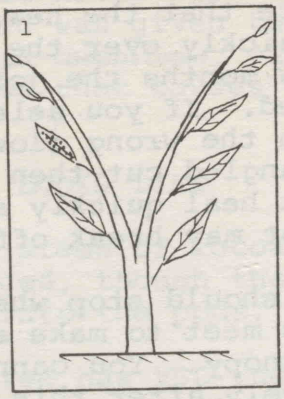
Chemicals

There are no chemicals available at the moment for controlling VSD.

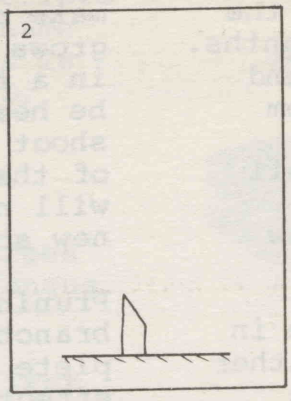
Quarantine

You cannot take cocoa plants and seeds from areas with VSD into VSD-free provinces. A special quarantine procedure does allow seed to be sent from L.A.E.S. after careful inspection. If you live in a VSD-free area and want to plant. cocoa, see D.P.I. about getting seed or buddings.

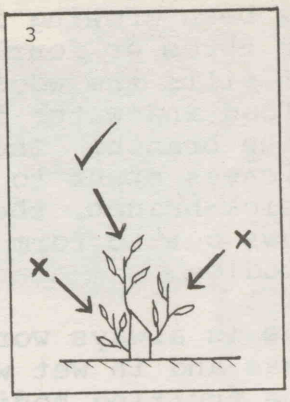
HOW TO PRUNE VSD IN YOUNG SEEDLINGS



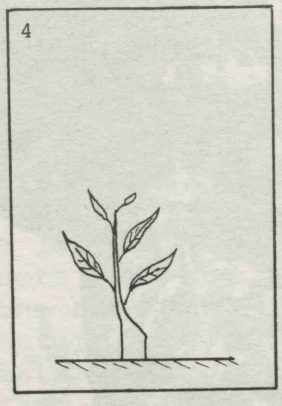
Split the plant to see the brown streaks in the wood

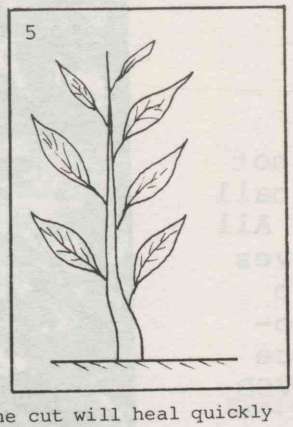


Cut at an angle 30 cm beyond the last brown streak and 20 cm from the ground

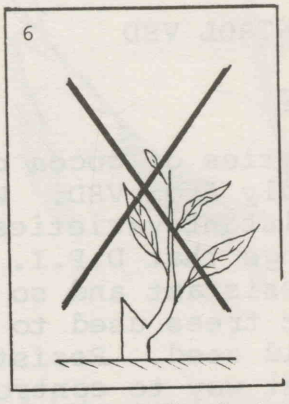


Select the top shoot on the high side of the cut





This shoot will grow and the cut will heal quickly



Don't select the shoot on the low side of the cut

OTHER PLANTS THAT GET VSD

We believe that other plants in the bush can get VSD. It was presumably these plants that passed the disease onto cocoa when it was first planted. We do not know which plants these are.

ACKNOWLEDGEMENT

I thank John D'Donohue for pointing out the correct way to prune seedlings.

FURTHER READING

Prior, C. (1980). *Vascular-streak Dieback of Cocoa.* A booklet produced by the Cocoa Board. Available free from the Cocoa Board, P.O. Box 532, Rabaul.

Prior, C. (1980). Vascular-streak dieback. *Cocoa Growers' Bulletin 29*, 21-26.

FURTHER INFORMATION

For further information and advice about vascular-streak dieback of cocoa, you should contact:

The Chief Plant Protection Officer, D.P.I., P.O. Box 417, Konedobu (Tel: 214699)

or The Officer-in-Charge L.A.E.S., P.O. Keravat E.N.B.P. (Tel: 926251)

Copies of this Plant Pathology Note, and of others in the series are available from the Publications Officer, Publications Section D.P.I., P.O. Box 417, Konedobu