TRIALS TO CONTROL COCONUT ROOT (WILT) DISEASE

Cutting and removal of infected palms including lightly infected ones, spraying the cut palms with insecticides and elimination of soil infectivity before planting new seedlings are features of experiments to be conducted to test the feasibility of control of coconut root (wilt) disease in Kerala

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IT will be advisable now to establish plots for experimental attempts at the control of coconut wilt disease in Kerala. Attention should be given first to areas in which almost all of the trees are still healthy. In these areas the few trees that may now be found diseased will not have been infected very long on the average. Under such conditions the difficulties are less than in heavily diseased areas and methods can be devised and tested with the least possible expense. A number of separate plots should be used in order to test different procedures under a great variety of conditions.

REMOVE LIGHTLY AFFECTED TREES TOO

Let us suppose that an area can be found for one of these plots in which there are several thousand coconut trees altogether, with only two trees showing

wilt disease, one of these severely but the other only lightly. Bearing in mind that we want most of all to protect the large number of trees that still are in healthy condition, we must test the effect of removing, and destroying all the parts of the two infected trees. *It will not suffice to remove and destroy only the one severely affected tree. Both trees must be removed.* The lightly affected tree may be a greater danger to nearby healthy trees than its more severely affected neighbour is. It may be more attractive to the lacewing bug, *Stephanitis typicus* Dist., which is thought to act as the insect transmitter of coconut wilt disease in Kerala. On this account it may be a more effective reservoir of disease than the severely affected tree is.

TREAT CUT TREES WITH INSECTICIDE

When the two diseased trees have been cut, they must be sprayed or dusted *at once* with an insecticide, such as 5 per cent DDT or 5 per cent Chlordane, (but not with any stronger concentrations than this, for insects often detect and avoid stronger insecticides). Infective lacewing bugs may otherwise leave the foliage as the leaves on which they are feeding begin to dry out. The bugs may fly to the tender leaves of healthy coconut trees, where they may start new cases of wilt disease by their feeding. The possible safety of omitting such insecticidal dusting or spraying *must be tested by later experimentations.* Of course, it would be cheaper not to use insecticides if they should prove to be unnecessary, but in first attempts to control wilt disease they should be used with care and liberally. If such a part as the coconut cabbage is to be used for food, it probably should be removed before the foliage is sprayed with any insecticide, because the poisonous insecticide might be difficult to remove even by thorough washing.

When the two trees have been cut down and their insects made harmless by insecticidal dusts or sprays, their parts may be utilized in any way that experiments may show will not prove dangerous in spreading disease. Immature fruits and the tender cabbage can be prepared perhaps as food; leaves can be used presumably as thatching; trunks can be used if desired for lumber; *but all remaining parts should be burned* if they are not useful for some harmless purpose; this would apply to such parts as unused husks, the inflorescences, the spathes, any poor quality leaves, the petioles etc.

TEST SOIL FOR INFECTIVITY

Then the soil near the stump of each tree and at various distances from the stump must be tested for infectivity. The most advantageous locations for collecting soil samples will be determined by future experimentation, but the samples taken at a depth of one foot, about 12 inches from the base of the tree will generally prove to be reasonably satisfactory.

If the soil near the base of the slightly affected tree shows no infectivity *on repeated testing,* a seedling coconut can be planted at once at this site. It is best to use one grown from seed of a still healthy palm in the same diseased area, because this may happen to represent a naturally selected line that is genetically resistant or tolerant to wilt disease. *If the soil proves to be infective replanting should be delayed and the soil tested again from time to time.*

The other site, near the more severely affected palm, is very likely to furnish infective soil samples at least at first. It may, of course, require a long time to become completely uninfective.

GROW INTERCROPS TILL INFECTIVITY DISAPPEARS

Until the soil has lost infectivity entirely, it should not be planted to coconut but only to some other crop. *No legume or palm species should be used for this purpose unless its immunity to the coconut wilt disease has been established experimentally.* Such undercrops as tapioca and sweetpotato may prove to be satisfactory, but *further experiments must be made at once to show which undercrops will best hasten, or at least not interfere with, the return of the site to a normal state of uninfectivity.* When an undercrop has been harvested, a seedling coconut can be planted if the soil tests seem to justify this. Otherwise, the under cropping should be continued until the soil loses its infectivity.

In future years such a plantation is likely to remain healthy, but it should be watched carefully by research teams from the Station. If another old palm or one of the seedlings should become infected from some unknown source, it too will have to be removed promptly and given an insecticidal treatment. Then, if the soil around it has not yet become infective, the tree can be replaced by a coconut seedling at once.

Information obtained by such experiments in lightly affected areas will be useful in devising experiments designed to solve the much more difficult problem of controlling wilt disease in places where it has become widespread. In such places, large acreages may need to be studied and treated. Careful regard to detail must not be neglected in the effort to work on more land at one time.

If (1) only the very badly affected old palms, which are non-productive and beyond the stage of recovery, were removed, if (2) these were not treated with insecticide *before or immediately after their removal,* and if (3) the trees that are destroyed were replaced by coconut seedlings at once, without testing for possible soil infectivity, a disastrous spread of wilt disease might be caused by the very effort that is intended to lessen the amount of this disease.

WHERE HEAVY INFECTION OCCURS

In heavily infected areas we shall have more difficult and more expensive problems than we have in lightly affected localities, but it will pay to make enough experiments to learn how to solve these problems safely. All the diseased trees, including even the least affected cases, will have to be cut down in the initial experiments, dusted or sprayed at once with insecticide unless this has meantime been shown to be unnecessary, and after proper disposal of the cut trees the soil around their stumps will have to be tested. This entire process of destroying diseased trees will cause great financial hardship, but some materials may be salvaged, such as the immature nuts and cabbages for food, the trunks for lumber, and the leaves for thatching or fuel. Infective soil must be kept out of coconut culture perhaps about twice as long as it takes the soil to return to its normally uninfective condition. Later experience with slight variations of this procedure in some of the experimental

plots will soon teach the scientist-in-charge whether some of the precautions are unnecessary in general, or in specific regions such as areas where insects on the trees may be few or absent. Not all areas will face the same problems. Soils are as different from each other as people are.

After the first removal, treatment, and safe disposal of diseased trees, *it will be especially important in heavily diseased areas to resurvey the plantations frequently* to find any new outbreaks of disease that may come from undiscovered diseased trees or from insect infestations and to remove new cases of disease promptly, replanting at once if soil proves entirely uninfective but only after one or more undercrops have been harvested if soil infectivity occurs and persists for a long time.

REDUCTION OF STEPHANITIS POPULATION

After replanting operations are completed, any unusually abundant colonies of *Stephanitis typicus* might well be watched for and reduced to small numbers by the application of insecticides. The relatively large numbers of lacewing bugs usually present and the observed slowness of spread of wilt disease are enough to assure us that any efficiency that stephanitis may have in spreading the disease is of a very low order. Hence the reduction of excessive populations of the insect may be expected to be enough to lower the lacewing bug's efficiency radically and possibly to eliminate its already low tendency to migrate from reservoirs of disease to nearby healthy coconut trees.

FACTS TO REMEMBER

In summary, it must always be remembered that removal only of severely affected trees will be likely to leave the most efficient source of the infective agent for further spread by insects, in the form of actively developing disease in lightly affected trees, *which presently will become severely affected trees themselves.* It should be clearly realised, too, that prompt replacement of trees that are destroyed without repeated and careful testing of soil where new seedlings are to be planted *is likely to increase the rate of spread of wilt disease rather than to decrease it.* And again, removal of wilt-affected trees without prompt insecticidal treatment may cause the scattering of infective lacewing bugs that otherwise would not have migrated from these trees. These three dangerous procedures, unfortunately, are currently being applied by some growers in the hope of eliminating coconut (root) wilt disease. They are more likely to increase than they are to decrease the incidence of wilt disease.