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THE ROOT (WILT) DISEASE OF COCONUT IN KERALA

S.B. Lal

The root (wilt) disease of coconut was discovered 80 years ago and is now spread over one lakh acres in the Central Kerala. It is spreading both towards north and south but fortunately the spread is slow.

The main symptoms of disease are wilt accompanied by flacidity of lesflets and abnormal bending of leaves. The outer whorls of leaves often show yellowing. The leaflets also show necrosis of tips of leaflets. The leaves are stunted and the crown is reduced. The trees show abnormal button or immature but shedding. The trees gradually degenerate and the yields are reduced. It takes about 3-4 years for a 6-15 years old plant and 10-15 years for 25-35 year one for complete degeneration. Seedlings under 4 years of age are generally not infected. Root rot caused by Rhizoctonia solani is associated with the disease. The leaf rot infection due to Bipolaris halodes is also more common on wilt-infected trees.

Nutrient deficiencies or toxicities do not seem to be the cause of the disease. It occurs on all soil types but is associated with soils with poor aeration. Microfloral population and microbiological activity of healthy soils were higher compared to diseased soil. A virus like pathogen seems to be the cause of the disease. Pathogenicity trials in field were successful both by mechanical inoculation with diseased sap and through the tingid bug, Stephanitis typicus. In insect-proof greenhouse tests on seedlings, positive transmission has been obtained by both the methods as also through soil with infective roots. Cowpea (Vigna sinensis) has been in use as an indicator host. It produces abnormalities of trifoliate leaves due to infection with the pathogen. The reaction is, however, erratic and seems to be very sensitive to climatic factors. The insect vector S. typicus, gives better percentage of infection in cowpea seedlings although it is forced to feed on it. A minimum of 1 viruliferous insect per seedling can produce 5 per cent infection, in cowpea seedlings. It takes 2 hours of minimum feeding to acquire the virus. Ten insects after 24 hours of acquisition feeding take 16 hours of feeding to produce infection. The insect retains infectivity for 22 hours. Transmission through nematodes and fungi (Olpidium sp. etc.) is also being attempted. Whether the disease is seed-borne is also being investigated.

No control measures except judicious manuring and cultural practices are recommended. Eradication of disease in new areas is under experimentation. No resistance has yet been located in indigenous and exotic varieties of coconut.

PROCEEDINGS

TOPIC : VIRUS DISEASES OF PLANTATION CROPS

Date:18.5.1966; Time:10:00 AM - 1:00 PM

Speakers:

1. Dr S.B. Lal - Leader
2. Mr S.N. Chatterjee
3. Dr B. Ganguly
4. Dr P.S. Rao
5. Shri H.S. Sahambi - Recorder

Dr S.B. Lal gave in detail the work done so far on the root wilt disease of coconut. The disease, first recorded 80 years ago, is present over 1 lakh acres in the Central Kerala and is spreading slowly towards North and South. The disease appears to be caused by a virus which is mechanically transmitted. The tingid bug, Stephanitis typicus, has been shown to be the vector. Cowpea has been recorded as an indicator host of the virus. The disease also appears to be seed borne. The role of fungi (Olpidium sp. etc.) and nematodes, if any, in the spread of the virus is being investigated.

Mr S.N. Chatterjee reported investigations carried out so far on mulberry mosaic and yellow-net viruses. Mulberry mosaic is mechanically transmitted as also through Rhopalosiphum maidis, Myzus persicae and Aphis gossypii. Morus alba vars. Ichinose and Kairyonozymagaishi and M. latifola vars. Oshimasho and Kosen have been found to be resistant. The yellow-net of mulberry is transmitted through the white-fly, Bemisia sp.

Dr B. Ganguly covered the work done so far on 'Chirke' disease of large cardamom. The virus is sap-transmitted as also through the aphids Rhopalosiphum maidis and Brachycaudus helichrysi. The virus infects wheat, ginger and Acorus calamus also. Large cardamom varieties Sawney and Kopringe and Ridley wheat have been found to be highly tolerant. A rapid serological method using agglutination test has been developed to identify the diseased plants in field. The virus causes more than 90 per cent loss in yield in the 3rd year of infection. Dr Ganguly referred to Foorkey disease of large cardamom. Although Pentalonia nigronervosa has been shown to transmit the virus at Poona, it gave negative results at Kalimpong in the tests carried out so far.

Dr P.S. Rao spoke on virus diseases of sandal (Santalum album) of which spike disease is the most serious one. Leaf curl is another possible virus disease but its incidence is negligible. A new disorder resulting in smalling of leaves was recorded recently but the disease disappeared soon as all the infected plants were killed. Whether or not it was of virus origin is not known.

DISCUSSION

Dr S.P. Raychaudhuri: Dr Lal, have any experiments been carried out with virus-free Stephanitis typicus on cow-pea?

Dr S.B. Lal: Yes, but these did not develop any symptoms. It may be mentioned that the viruliferous S. typicus infected only 30 per cent of the inoculated plants under optimum conditions.

Dr S.P. Raychaudhuri: remarked that observations made by Dr Lal indicates that the coconut wilt is an infectious disease.

Dr S.B. Lal: There is no doubt about the infectious nature of the malady.

Mr T.K. Nariani: Remarked that it could be a complex disease and more than one agency may be involved.

Mr T.K. Nariani: Will Dr Lal please state if any difference in the symptoms is observed in artificially inoculated plants as compared to those under field conditions?

Dr S.B. Lal: Yes, the artificially inoculated coconut plants only developed flaccidity, yellowing and some retarded growth. No necrosis or root rot developed in those seedlings.

Dr S.P. Raychaudhuri: Has doddar transmission been attempted?

Dr S.B. Lal: Not so far.

Dr P.S. Rao: How would you account for the absence of the disease in older palms, i.e. those about 30-35 years of age and younger seedlings upto 3 years.

Dr S.B. Lal: These are the observations made under natural conditions. Nothing definite can be said about the basis governing these findings. Whether there is any antiviral reaction on the part of the young seedlings and older trees, cannot be explained at this stage. In case of older trees, old age resistance may be the factor.

Dr B.B. Nagaich: While Olpidium transmission is being attempted, whether R. solani which is associated with the disease has also been tried for transmitting the disease?

Dr S.B. Lal: Transmission through Rhizoctonia solani is also included in the programme of work.

Mr M.D. Mishra: What is meant by infective and non-infective days?

Dr S.B. Lal: These are just arbitrary terms. On certain days the inoculations give positive results while on other days, using same

technique, same variety of cowpea and the same source of inoculum, no infection is obtained.

Dr P.S. Rao: Dr Lal, can any correlation be made out of it?

Dr S.B. Lal: No, may be that positive infection needs certain specific conditions of temperature, light, etc. and specific requirements for good infection have yet to be standardized. The temperature of 20-28°C for 8 hour period has so far been found to be conducive for infection of cowpea.

Dr B.B. Nagaich: Was there any particular variety of cow pea employed?

Dr S.B. Lal: Of a large number of varieties tested, cowpea varieties New Era and Local Variety No.5 were found to be very good.

Dr B.B. Nagaich: What was the reaction on Guar?

Dr S.B. Lal: Guar plants could not get infection

Mr K.L. Dhingra: If the virus is present in the embryo, then 100 per cent or very high percentage of seed transmission should be expected.

Dr S.B. Lal: The disease does not appear to be seed-borne. Positive reactions in cowpea have, however, been obtained from the various parts of the seed including young embryo.

Dr K. Ramakrishnan: How is it that the disease appears in the 4th year stage in the seedlings when the virus is present in the embryo?

Dr S.B. Lal: The virus is not seed transmitted. It is present in the young embryo and is eliminated in some way from the immature embryo or the germinating seed nut.

Dr V.V. Chenulu: How is it that in transmission tests from coconut to coconut large quantity of the inoculum has to be employed over extended period?

Dr S.B. Lal: Just because we were not quite certain how much minimum inoculum would be required to infect seedlings also in an effort to ensure infection. Fortnightly inoculations on the same seedlings were continued till the symptoms began to appear.

Dr V.V. Chenulu: If inoculation is to be repeated a number of times, how can the incubation period be calculated?

Dr S.B. Lal: Yes, this is rather difficult. Our main objective was reproducing the disease in the first instance.

Dr V.V. Chenulu: remarked that to make the sap from leaves more infective, clay minerals like Kaolinite, etc. have been used with success. These could be tried in transmission tests.

Dr P.S. Rao: Dr Lal, is there any resemblance between yellow leaf of arecanut and coconut wilt?

Dr S.B. Lal: No, the yellow leaf disease of arecanut has not yet been transmitted. So far it appears to be a deficiency - toxicity complex rather than a virus disease.

Mr M.D. Mishra: Have any transmission tests been conducted with the nematodes?

Dr S.B. Lal: The three genera, Xiphanema, Trichodorus and Longidorus, which are known vectors of plant viruses have been isolated from the soil around diseased coconuts. It was observed that the total population of nematodes was always higher in the soil from diseased trees. Work on the transmission of the virus through these three genera will be taken up shortly.

Dr V.V. Chenulu: Have any transmission tests been conducted from cowpea to cowpea series.

Dr S.B. Lal: Yes, both from cowpea plants infected mechanically as well as those through the vector.

Dr S.P. Raychaudhuri: How about the tests from the cowpea to coconut? What is the percentage of transmission of the disease from coconut to coconut?

Dr S.B. Lal: It has not yet been tried due to non-availability of inoculum from cowpea in sufficient quantity. As regards transmission from coconut to coconut, the number of seedlings tried was very small and hence no percentage of transmission can be given at this stage.

Virus Diseases of Large Cardamom

Dr V.V. Chenulu: What is the incidence of 'Chirke' and 'Foorkey' diseases? Which of the two is more important?

Dr B. Ganguly: In certain plantations, even 80 per cent of large cardamom plants have been found infected with 'Foorkey' disease while in the case of 'Chirke' 13 to 15 per cent infection has been recorded in most cases.

Dr S.P. Raychaudhuri: remarked that Foorkey is certainly more important.