UNIVERSITY OF NAIROBI

DIPLODIA DIE-BACK OF EXOTIC PINES IN KENYA CAUSED BY *DIPLODIA PINEA* (DESM.) KICKX. FL. FLANDERS

BY

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SUMMARY

Diplodia pinea (Desm.) Kickx Fl. Flanders was discovered for the first time in Kenya in 1973. The evidence suggest that it was not present in Kenya before 1968. Between that period and the year of discovery in 1973 it has spread over most of the *Pinus radiata* plantations in Kenya.

The comparative study of *D. pinea* spores obtained from New Zealand and other temperate zones revealed that the organism found in Kenya is culturally and morphologically similar to those from New Zealand.

The pathogenicity of *D. pinea* was confirmed and die-back observed in *P. radiata* plantations in Kenya attributed to the organism. The disease severity decreased with increase in altitude. In the forest sites where the severity was localized, such places were characterized by depressions or marshes with soils having high pH values; high available organic carbon; high extractable potassium, calcium and iron ions.

The decrease in disease severity with altitude seemed to be linked with ultra violet component of solar radiation which rendered *D. pinea* spores less pathogenic by prolonging the germination period thus limiting the chances of successful germ tube penetration. In the laboratory studies, U.V. radiation reduced the spore size, the spore population per pycnidium; germ tube elongation rate and induced spore septation a phenomenon which inhibited the germination of *D. pinea* spores.

Significant variation in spore morphology was found

to exist within the country depending on the location of the host material. It was concluded that the variation in morphology of D. pinea spores from various altitudes was a function of variation in intensities of ultra violet radiation and that host infection was enhanced by temperature, relative humidity and mechanical wounding of host trees.

The practical significance of the variation of D. pinea with site in relations to control of diseases is discussed.

It was found that D. pinea affected Pinus radiata severely. P. patula and other softwood species were relatively more immune to the pathogen. A water soluble factor was extracted from Pinus patula bark which had lysing effect on germinating D. pinea spores. The significance of this discovery as a tool in crop breeding for disease resistance is discussed.

Chemical control was found to be only effective if the trees are sprayed before the onset of disease. It was concluded that cultural practices such as removing dead trees, avoiding silvicultural operations that would inflict wounds at critical times as well as choice of site and species would provide adequate protection of Pinus radiata against Diplodia die-back. Breeding for disease resistance was reckoned feasible and recommended accordingly.

The economic importance of Diplodia pinea in Kenya softwood plantations was discussed and concluded that it was not serious enough to warrant the abandoning of P. radiata. It was further concluded that the selection

of sites in order to favour high altitude zones where U.V. component of solar radiation was relatively high, and temperatures low will eliminate effects of D. pinea thus reducing losses incurred from the disease.

Further areas of study on characterization of resistance elements in pines, Biological studies of pine extracts and evolution of breeding techniques for disease resistance based on resistance element are recommended.