

C 581-2  
SFN

Phytophthoras on cocoa (Theobroma cacao L.)  
in Sri Lanka, pathogen taxonomy  
and resistance studies.

By

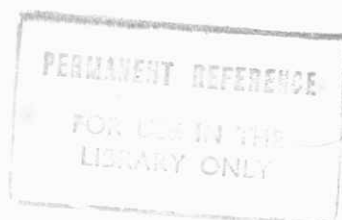
MEDERIKOTUWEGEDARA ASOKA PUSHPA KUMARA

SENEVIRATNE

B.Sc. Agric. (Sri Lanka)

A thesis presented in part fulfilment of the requirements  
for the Master of Philosophy in the Faculty of Science  
of the University of Peradeniya.

Department of Botany  
Faculty of Science  
University of Peradeniya  
Peradeniya  
Sri Lanka.



May 1987

406698

ABSTRACT

This study was carried out to determine the distribution of Phytophthora species on cocoa in Sri Lanka. Phytophthora infected cocoa pods were collected from the different cocoa growing areas and the pathogen was isolated. A detailed study on colony morphology, growth characters on Lima Bean Agar (LBA), sporangial morphology, dimensions and number, pedicel length of sporangia, chlamyospore diameter and number, mating behaviors and growth on pods of cocoa was done. Taxonomic studies revealed that all the isolates resembled Phytophthora palmivora Morphological Form 1 and belonged to A<sub>2</sub> compatibility type.

A significant variation was observed in the sporangial length, sporangial breadth, sporangial l/b ratio, pedicel length, sporangia number, chlamyospore number and chlamyospore diameter of the isolates within a location indicating high variability among isolates within a location. Except for sporangial number and chlamyospore number, other characters varied significantly between locations too. Variability of the growth patterns of the isolates was also observed.

Studies on genetic type correlation showed the importance of sporangial breadth to l/b ratio, production of small chlamyospores by fast growing isolates and the importance of chlamyospore number in disease development.



Pod inoculation tests showed that the increase in the lesion size was constant over the first 3 days and this constant varied with the isolate. It was found that the colony growth, lesion size and rate of growth of the lesions could not be correlated.

Varietal screening tests showed that among the W5 varieties of cocoa W5/390 was the most resistant variety while W5/5 was the most susceptible one. Of the W6 varieties examined, W6/434 was found to be the most resistant variety while W6/457 seemed to be the most susceptible one. Of the ICS varieties tested ICS 95 was the most susceptible one. Among the other varieties NA 32 x UIT<sub>1</sub>, NA 32, Amelonado and A-9 seemed to be susceptible while SCA 6 x ICS 6, PA 35, and RW 17 were resistant to Phytophthora infection. The size of lesion on cocoa pods for 5 days was measured using 5 varieties and the results showed the increasing rate of lesion could be fitted to an exponential curve. This curve may be useful for predicting the lesion size within a 5 day period.

The results of the leaf inoculation test showed that varieties ICS 6 and ICS 95 were resistant to Phytophthora infection ICS 95 being the most resistant one. It appeared that the lesions produced on susceptible varieties were dark brown in colour and spreading type when compared to the lesions produced by the resistant varieties. In resistant varieties

lesions were light in colour and of restricted type. It was not possible to see differences in lesion characteristics of medium and highly susceptible varieties.

Two leaf inoculation methods using a zoospore suspension and mycelial discs showed that a high degree of agreement existed between these 2 methods.

When comparing the degree of agreement between the leaf inoculation test (using mycelial discs) and the pod inoculation test (using mycelial discs) it was found that there was no agreement between the two methods.

Antifungal activity of cocoa pod tissues determined by t.l.c. Cladosporium bioassay revealed that healthy cocoa pods seemed to contain one antifungal compound (Rf 0.57) mostly confined to the outermost layer of the cocoa pod and inoculation with P. palmivora and wounding apparently increased the antifungal activity probably by forming atleast two more compounds.

Increased antifungal activity in tissues inoculated with P. palmivora was due to the presence of two additional compounds, one soluble in both ethyl acetate and chloroform and other only in chloroform.

Of the twenty cocoa varieties tested 12 varieties showed antifungal activity in healthy tissues and inoculation of most varieties tended to increase such activity. On comparison of the antifungal activity with the degree of lesion development no correlation was obtained between the two.

The antifungal activity of tissues could not be consistently demonstrated and appeared rather unstable.