

Strain variations among *Fomes durissimus* Lloyd attacking different host wood

S. SANTRA and B. NANDI

Department of Botany, Burdwan University, West Bengal, India

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ABSTRACT

The strains of *Fomes durissimus* Lloyd from different host were pairwise tested to show the nature of antagonism between the interacting mycelia. Also cross-inoculation tests were performed to establish the aggressiveness and virulence of different strains.

INTRODUCTION

Investigation concerning the existence of different strains of a wood-rotting species, offers an important aspect for evaluating the degree of their decaying activities on different hostspecies. Schmitz (1925) in *Fomes pinicola* (Sw.) Cooke and Verral (1934) in *F. igniarius* (L.) Gill. observed distinct line of demarcation in all pairings between monosporous mycelia and between cultures obtained from different sporophore tissues. Adams and Roth (1967) also noted similar demarcation lines in paired cultures of *F. cajanderi* Karst. The existence of such antagonistic behaviour among the cultures of the same species forms the basis for detecting their genetical differences.

MATERIAL AND METHODS

The present investigation has been designed to study the existence of such strain variations in *Fomes durissimus* Lloyd growing extensively on economic timber yielding trees *Swietenia mahogani*, *Casuarina equisetifolia* and *Mimusops elengi* in the University campus of Burdwan. The identification of fungus was confirmed by comparing with the collections of Professor S. R. Bose in Calcutta and particularly the authentic mate-

rial identified by Dr. E. M. Wakefield, formerly of Royal Botanical Garden, Kew. On critical examinations it was found that the organisms from the three hosts differed to some extent in structure as well as in their cultural behaviours. With this end in view, the present experiments have been undertaken along the following two lines of inquiry. Firstly, to study by pairing the interactions between the strains obtained from the three different hosts with the presumption that any variations among the strains may result in antagonism. Secondly, to establish the decaying capacities of the strains of *F. durissimus* by cross-inoculation-tests of the sapwood of the aforesaid hosts with the different strains under a set of controlled conditions.

The mycelia of the three strains of the test-fungus, obtained from fructifications growing on three hosts, were paired in all possible combinations in Petri dishes (100 mm diam) containing 2% cleared malt-agar and incubated at 30° C in complete darkness. After ten days of growth, the line of contact of the pairing mycelia was examined under the microscope. The advancing hyphae of the interacting mycelia overlap each other except in pairing of same cultures where they fuse. A narrow but distinct line of aversion appears between the interacting mats which after twenty days' growth became dark yellowish brown in colour with somewhat raised hyphae. The results obtained are given in the table 1.

Previous workers have suggested that aggressiveness and virulence of several strains of a species are not always uniform so far as their host relations are concerned. To determine this relationship, cross-inoculation experiments adopted by Banerjee and Purkayastha (1957) have been made for evaluation of the activities of the different host-species.

Rectangular wood-block measuring 2" × 1" × 1/2" were cut from sound sapwood of *S. mahogani*, *C. equisetifolia* and *M. elengi*. They were serially numbered and dried to constant weight at 60° C in an oven. The blocks were then rapidly soaked in distilled water under reduced pressure to avoid leaching. The blocks with their moisture content above "fibre-saturation-point" were sterilized at 15 lbs pressure for 20 minutes. Kolle flasks containing about 90 cc of 2.0% malt-agar medium were sterilized, inoculated separately with the mycelia of the three strains of *F. durissimus* and incubated at 30° C in complete darkness until the mycelia covered the surface of the medium. The sterilized sapwood-blocks of all the aforesaid host-species were separately introduced into the Kolle-flasks, four in each and exposed to the cultures of all the three strains isolated from different hosts and incubated for a period of four months at 30° C in darkness. A set of Kolle-flasks with wood-blocks but without the mycelia, kept under identical conditions, served as control.

At the end of four months' test the wood-blocks were taken out from Kolle-flasks, superficial mycelia were carefully removed without damag-

ing the surface of the blocks and dried to constant weight. The difference between the initial and final weights gave the loss in dry weight in four months, from which loss in percentage was calculated.

The results are given in table 2.

RESULTS AND DISCUSSION

From the Table 1, it is evident that in all cases the pairings show antagonism between the interacting mycelia excepting the cultures which are self paired. In the latter case, the interacting mycelia do not show any line of aversion and intermingle freely showing hyphal fusion between them. These interacting mycelia have been expressed as compatible to

Table 1
Pairing of three different strains of *Fomes durissimus*
from three different hosts

	<i>S. mahogani</i>	<i>C. equisetifolia</i>	<i>M. elengi</i>
<i>S. mahogani</i>	C	A	A
<i>C. equisetifolia</i>	A	C	A
<i>M. elengi</i>	A	A	C

A — antagonism; C — compatible

each other. On the other hand, mycelia, obtained from different fructifications growing on different host-species show complete antagonism between them indicating the presence of strain variation within the species. Such intersterility between the mycelia of the same species is however, not uncommon as have been previously reported by Mounce (1929), Verrail (1934), Arnold (1936) and others.

From Table 2, it appears that there exists a definite relation between the strains under consideration and the aforesaid hosts. The strains differ markedly in their aggressiveness and virulence on different host-species

Table 2

Average loss in dry weight of sapwood blocks of *S. mahogani*,
C. equisetifolia and *M. elengi* due to decay by three strains
of *F. durissimus* after 4 months' test

Strain from	* Loss of wood in dry weight (%)		
	<i>S. mahogani</i>	<i>C. equisetifolia</i>	<i>M. elengi</i>
<i>S. mahogani</i>	10.30	6.40	7.16
<i>C. equisetifolia</i>	9.13	9.30	6.10
<i>M. elengi</i>	7.23	6.86	6.80

* Average of ten blocks

as they considerably differ in their decaying activities. All the three strains show maximum capacities to decay on wood of *S. mahogani* than the other two hosts.

This variation in decay may be due to difference in the degree of resistance offered by the hosts on the basis of their physical and chemical properties. The losses due to decay caused by the three strains of the test-fungus on the same host also show significant difference. The sapwood of *S. mahogani* shows 10.30% loss in dry weight due to the strain from *S. mahogani* but 9.13% and 7.23% losses respectively due to the attack of the strains from *C. equisetifolia* and *M. elengi*. According to Findlay's classification (1938), *S. mahogani* is, therefore, nonresistant to the strain growing on its own tissue but somewhat moderately resistant to the other two strains. *C. equisetifolia* shows 6.40%, 9.30% and 6.86% losses when subjected to the attack of the strains from *S. mahogani*, *C. equisetifolia* and *M. elengi* respectively. *M. elengi* on the other hand, suffers 7.16%, 6.10% and 6.80% losses due to attack of strains from *S. mahogani*, *C. equisetifolia* and *M. elengi*. *C. equisetifolia* and *M. elengi* are, therefore, "moderately resistant" to all the strains. Such differential behaviour of the three strains in causing decay of the same host wood may be accounted for their difference in behaviour governed by their genetic differences.

SUMMARY

The strains of *Fomes durissimus* Lloyd growing on *Swietenia mahogani*, *Casuarina equisetifolia* and *Mimusops elengi* were paired in all possible combinations in order to find out the nature of reactions existing between the interacting mycelia. The host relations of the strains have also been studied by cross-inoculation experiments of the sapwood of aforesaid hosts with the different isolates under a set of controlled conditions for studying their relative variation in decay.

The pairing experiments show antagonism between the interacting mycelia in all the cases excepting when the cultures are paired with their own subcultures revealing strain variations of the test-fungus.

From cross-inoculation tests, it appears that the variation in the average percentage of loss in dry weights of each host-species is dependent on the aggressiveness and virulence of the mycelia of different strains of the test-fungus. All the strains show their maximum decay on *S. mahogani*, moderate on *C. equisetifolia* and *M. elengi*. *S. mahogani* is therefore, considered as "least resistant" among the three host-species while *C. equisetifolia* and *M. elengi* may be considered as "moderately resistant".

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Authors' address:

Dr. B. Nandi and Dr. S Santra

Department of Botany Burdwan University
Burdwan; W. Bengal; India

Różnice między szczepami *Fomes durissimus* Lloyd atakującymi różne gatunki drzew

Streszczenie

Szczepy *Fomes durissimus* Lloyd występujące na *Swietenia mahogani*, *Casuarina equisetifolia* i *Mimusops elengi* były badane parami we wszystkich możliwych kombinacjach celem wykrycia natury interakcji między grzybniami. Wyniki tych doświadczeń wykazują silny antagonizm między szczepami, z wyjątkiem subkultur z tego samego szczepu.

Badano także wyniki inokulacji drewna gospodarzy różnymi szczepami, aby stwierdzić stopień wywołanego rozkładu drewna.

Wszystkie szczepy wykazują maksymalny rozkład drewna *Swietenia mahogani*, zaś średni drewna *Casuarina equisetifolia* i *Mimusops elengi*.