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CULTURAL CHARACTERISTICS AND REPRODUCTIVE MORPHOLOGY OF *GEOTRICHUM* SP. : A GUIDE TO DISTINGUISH *GEOTRICHUM* FROM *RIGIDOPORUS MICROPORUS*

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ABSTRACT

Culture characteristics of Geotrichum *sp. isolate IMI 354411, a fungus responsible for the saprophytic colonization on* Hevea *roots are described. It was also shown that this fungus could be easily distinguished from* Rigidoporus lignosus, *a devastating pathogen of* Hevea *roots, by the zonate and cloudy appearance of its colonies on malt agar with a cream undersurface and the disarticulating hyphae which later break upto arthric conidia.*

Key words: culture characteristics, *Geotrichum* sp., *Hevea brasiliensis*, *Rigidoporus microporus (R. lignosus)*

INTRODUCTION

The fungi that belong to the genus *Geotrichum* Link : Fr. are widely spread in nature and are commonly found in nutritionally rich, fluid substrates such as rotting plant material, pulp, food stuffs or polluted water (Anon, 1946; Cooke, 1963; Hoog *et al.*, 1986). This genus has not been reported as a serious pathogen of plants from any part the world. But it causes watering soft rots of fruits and vegetables called sour rot on citrus (Smith, 1917; Horn *et al.*, 1958; Sinclair *et al.*, 1962) melon (Ceponis, 1966) tomato (Poole, 1922) and root rot of carrot (Wright *et al.*, 1964; Suhag, 1982).

In early 1990's several reports were received about a fungal growth resembling white root disease, on roots of *Hevea* seedlings from commercial rubber nurseries in Ratnapura and Gampaha districts of Sri Lanka. In certain instances purchase of these affected budded stumps have been refused stating that plants are affected with white root disease pathogen *Rigidoporus microporus (R. lignosus)*, creating an unrest among the nursery owners. However, subsequent investigations showed that though these associations in rubber roots resemble *R. microporus* in

colour the colony morphology is quite different from that of *R. microporus*. The suspected fungus was isolated from the surface of affected roots and sent to International Mycological Institute for identification. The fungus was identified upto the generic level as a species of *Geotrichum* Link: Fr. (IMI 354) (Jayasinghe & Wettasinghe, 1997).

The aim of this study was to establish the culture characteristics and reproductive morphology of *Geotrichum* isolated from the surface of rubber roots using photomicrographs as characteristics of the *Geotrichum* associations with rubber roots have not been described in any part of the world previously. Characteristics of the rubber isolate of *Rigidoporus microporus* is also provided as *Geotrichum* has been misidentified as *R. microporus* in several instances-creating an unrest among the nursery owners.

MATERIALS AND METHODS

The *Geotrichum* sp. isolate IMI No. 354411 (Jayasinghe and Wettasinghe, 1997) and *Rigidoporus microporus* isolate RRISL 05 obtained from *Hevea* roots were maintained on Malt Agar (MA) medium at room temperature (28 ± 2°C). Culture morphology and other vegetative characters were observed using 7-day old cultures grown on PDA at room temperature under normal light and dark regime. The increase in diameter was taken as a measure of growth and diameter was measured along two axes at right angles to each other. Arthric conidia were studied on slide cultures prepared using bacto agar and a commercial preparation of lactophenol cotton blue (Difco) was used for staining purposes.

RESULTS AND DISCUSSION

Though both isolates were whitish in colour on MA they varied markedly in colony appearance. Colonies of *Geotrichum* had an uneven surface growth giving a zonate and a cloudy appearance (Fig. 1c). These colonies were with cottony dry aerial mycelium. The margin of the culture was somewhat feathery. Undersurface of the colony developed a cream colour after about a weeks growth (Fig. 1e) and the colony was about 80 mm in diameter on the 7th day. All hyphae disarticulated with maturity into cylindrical cells (Figs. 2a & c) which later break upto produce arthric conidia. The mature arthric conidia are more or less rectangular and 8-12 x 4-6 μm in size (Fig. 2d). The genus *Geotrichum* is characterized by the presence of arthritic spores (Hoog *et al.*, 1986) and these were found next to each other without intermediate sterile cells.

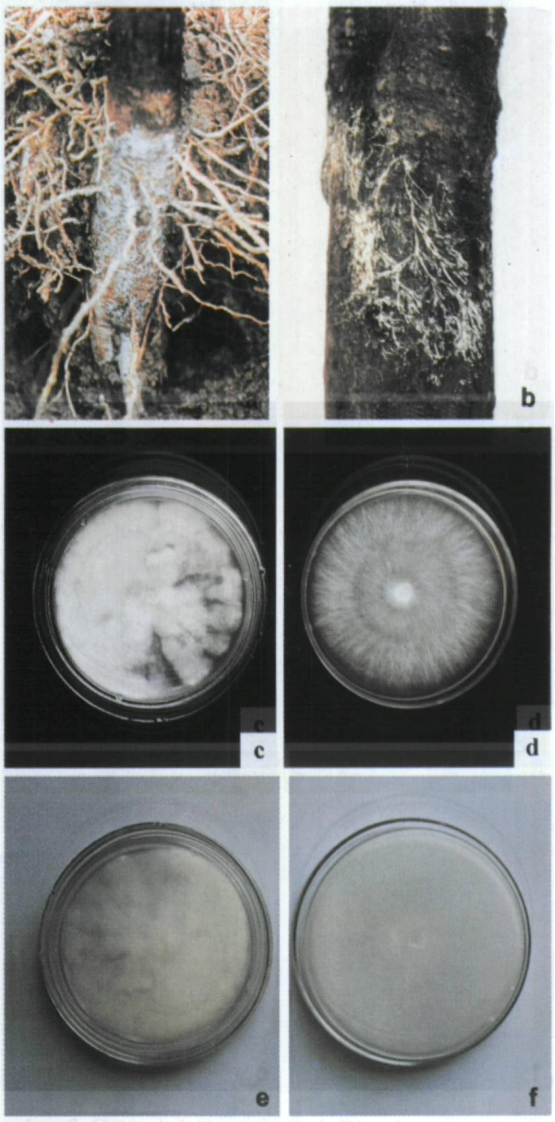

Fig. 1. Growth of *Geotrichum* sp. and *Rigidoporus* sp. on *Hevea* roots and malt agar.(a). whitish cottony superficial mycelium of *Geotrichum*; (b). characteristicrhizomorphs of *R. microporus*; (c). cloudy colonies of *Geotrichum* with zonate appearance. Note the development of cream colour on the undersurface (e); (d). radially growing flatten mycelia of *Rigidoporus* with slightly yellowish undersurface (f). (Fig 1 a & b, courtesy - Jayasinghe & Wettasinghe, 1996.)

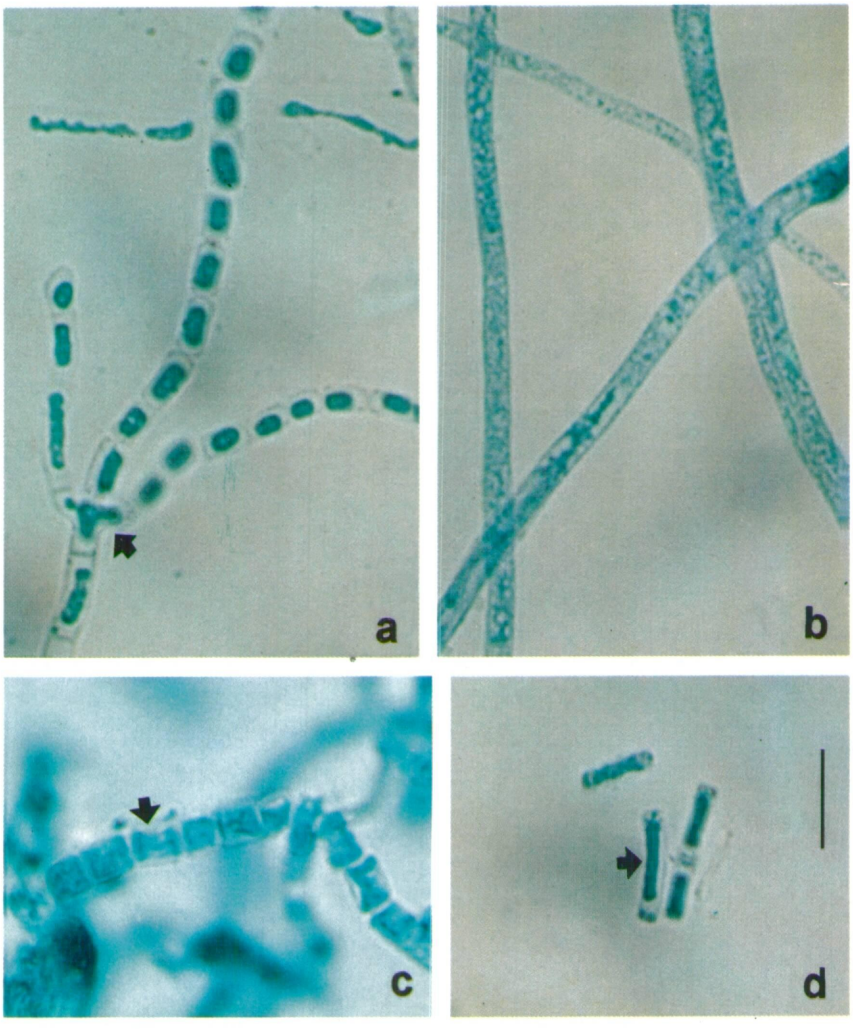

Fig. 2. Mycelial characteristics of *Geotrichum* and *Rigidoporus*. (a). hyphae of *Geotrichum* just about to disarticulate. Note the branching pattern; (b). hyphae of *Rigidoporus*; (c). disarticulating hyphae of *Geotrichum*; (d). liberated arthric conidia. Scale bar represents 10μm and all specimens are stained with lactophenol cotton blue.

Colony of the *Rigidoporus microporus* had a growth of 85 mm in diameter on the 7th day on MA. Colony had radially growing flatten mycelial growth and no cream colour developed on the undersurface as in *Geotrichum* sp. (Figs. 1d, f & 2b).

When *Hevea* seedlings affected with *Geotrichum* were examined a whitish cottony superficial growth of the fungus was evident on tap roots and laterals (Fig. 1a). No rhizomorphs characteristic to the genus *Rigidoporus* were seen on the invaded roots, instead loosely attached threads and a net work of whitish mycelium was observed (Figs. 1a & b). There was no collar rot or root rot due to the fungal attack. The tap roots and the laterals of the affected plants were found to be completely healthy and no above ground symptoms such as yellowing, wilting and buckling of leaves were observed. Unlike in *Rigidoporus* infections the mycelium could be easily removed if swabbed with wet cotton wool. When budded stumps with heavy *Geotrichum* growth were transplanted in the field the fungus disappeared as this was a saprophytic association on the root system.

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