broad to obliterating, 2–3 μm broad. Setae none. Basidia short, broadly clavate, four spored, 10–12 × 7–8 μm, sterigma 2–3 μm long, straight. Spores almost globose to slightly sub-globose, hyaline while young, becoming somewhat yellowish when mature, smooth, thick walled, 5–6 μm in diam in case of globose spores, others 5–6 × 5–5.5 μm, dextrinoid in Melzer's reagent.

Associated with white rot, sap wood becoming spongy and brittle, heart wood however not attacked. Parasitic on living *Santalum album* Linn with only the affected region dead. Botanical Garden, Calicut University, Kerala, 20-6-1984, *Ganesh G* 61 (HCIO, No. 37789).

Overall the present collection agrees well with that of *P. punctatus* from Western North America[2] and from E. Africa[3]; however, the cystidioles could not be observed and spores were slightly smaller.

Phellinus hohnelii (Bres.) Ryv. (figure 1b). Preliminary polypore flora of E. Africa p. 173, 1980. - Syn. *Fomes hohnelii* Bres. Ann. Mycol. 10: 499, 1912.

Fruitbody perennial, solitary, pileate, sessile, attached with a broad lateral base, sub-applanate to broadly ungulate, heavy, tough-woody, 27–57 × 17–30 × 7.5–15 cm. PILEUS sepia brown (4F4) to smoke brown (4F2) to coal black (3F1), younger areas slightly wine yellow (3B3); glabrous, rimose crusty, concentrically sulcate, older parts breaking into irregular blocks, radial cracks more prominent, rough in older regions; margin thick, rounded, smooth. Pore surface yellowish clay (5D5) when fresh becoming dark blonde (5D4) to nougat (5D3) to black when dry; surface somewhat uniform, rough, cracking irregularly with age; pores round, 3–4 per mm, up to the margin, dissepiments almost as thick as pore mouth width; pore tubes yellowish brown (5E8) becoming blackish brown when old, stratified, each layer about 0.6–1 cm thick, old tubes stuffed with context tissue. Context yellowish brown to blackish brown, up to 3 cm thick, absent between stratas, homogeneous, fibrous.

Hyphal system dimitic. Generative hyphae hyaline, thinwalled, branched, simple septate, 1.5–3 μm broad. Skeletal hyphae yellowish with a brownish tinge, thick-walled, less branched, simple septate, lumen broad, 2.5–4 μm broad, darkening with KOH. Setal hyphae present, brownish, thick-walled, acute, sometimes end obliquely projecting into the hymenium, up to 400 μm long, 6–10 μm broad. Setae present, ventricose to acuminate, brownish, thick-walled, 18–27 × 6–9 μm.

Occurring on living *Terminalia* sp in an evergreen forest causing white rot, the decay being confined to heart wood. Wefts of while mycelium are seen on decaying wood. The sporophores appear on the trunk as low as 2 ft up from the ground level to almost 20 ft Kamathalamudi, Parambiculam, Kerala, 12-11-1985, *Ganesh G* 269 (HCIO, No. 37790); idem, 12-7-1985, *Ganesh G* 219 (CALI).

The authors are grateful to Dr Leif Ryvarden, Universiteteti Oslo, Norway for his help in the identification of the specimens.

5 December 1985; Revised 9 April 1986

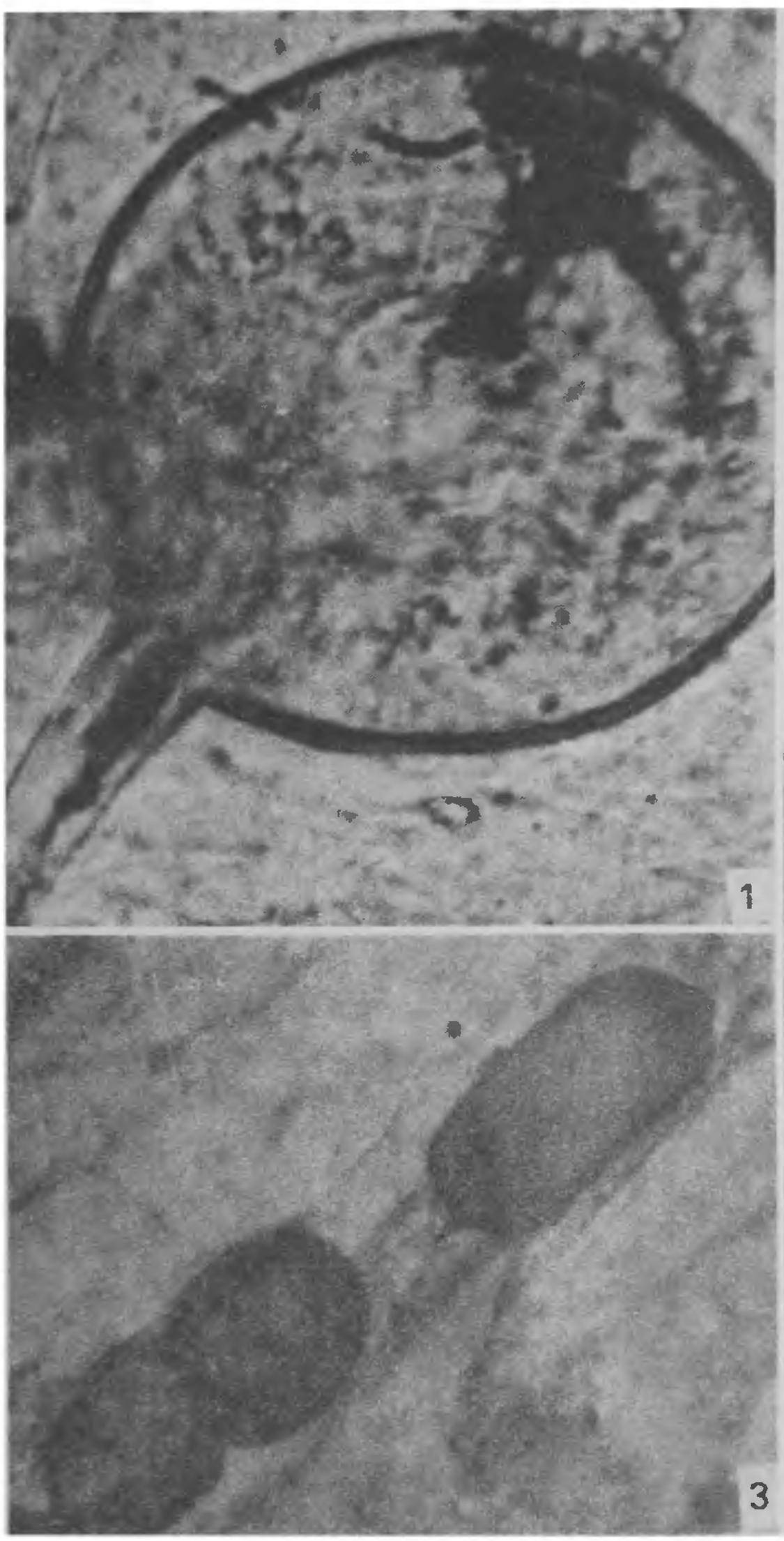
1. Kornerup, A. and Wanscher, J. H., *Methuen handbook of colour*, Methuen and Co, London, 1967, p. 243.
2. Gilbertson, R. L., *Mycotaxon*, 1979, **9**, 51.
3. Ryvarden, Leif and Inger, J., *Preliminary polypore flora of E. Africa*, Fungiflora, Oslo, Norway, 1980, p. 636.

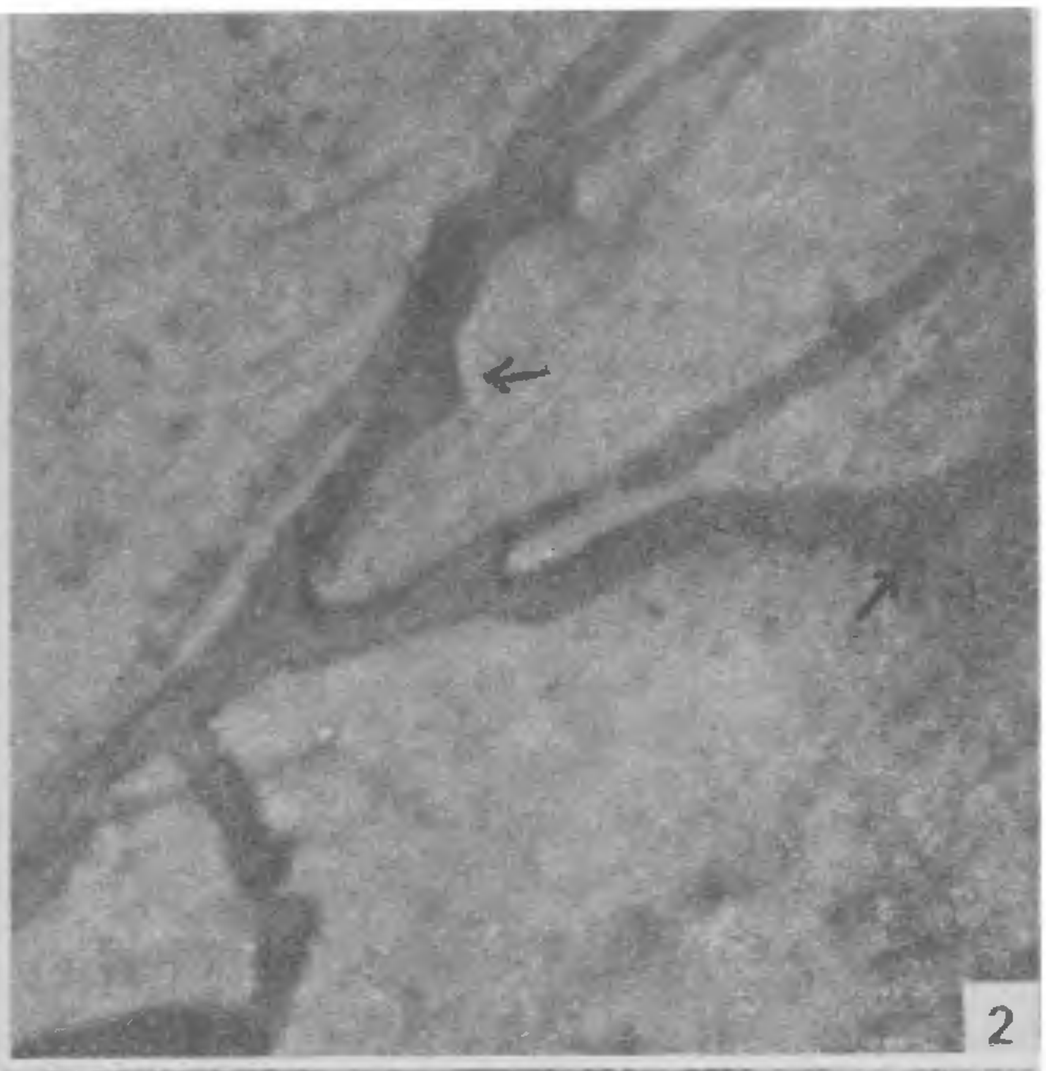
VESICULAR—ARBUSCULAR MYCORRHIZAL FUNGI IN ROOTS AND SCALE-LIKE LEAVES OF *CANNA INDICA* L (CANNACEAE)

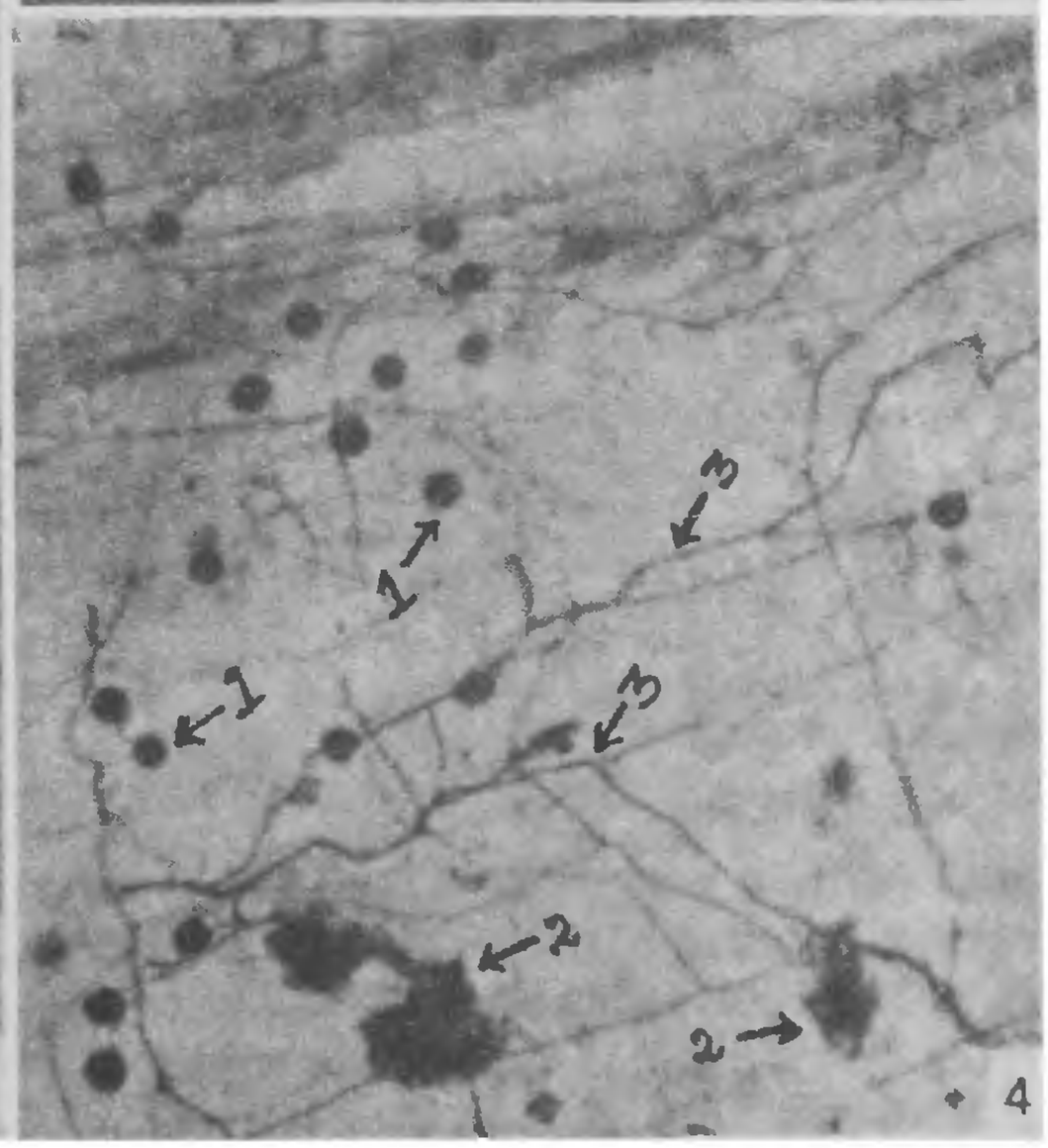
T. SELVARAJ, K. KANNAN
and C. LAKSHMINARASIMHAN
P. G. Department of Botany, A. V. V. M. Sri Pushpam College, Poondi 613 503, India.

VESICULAR-arbuscular mycorrhizas (VAM) have been reported in a wide range of plants including ornamental plants[1,2]. Reports on the occurrence of VAM fungi in scale-like leaves of some rhizomatous plants of Zingiberaceae have been made recently[3,4]. VAM fungi have also been reported to occur in modified leaves of *Salvinia*[5], senescent leaves of a moss[6], and decaying leaves of peanut[7]. Occurrence of VAM in roots and scale-like leaves of two cultivars of *Canna indica* L is reported in this communication.

The root and the scale-like leaves of rhizome of two cultivars (green leaved and brown leaved) of *Canna indica* L were collected from the botanical garden of this college. Roots and scale-like leaves were fixed in FAA, cleared with 1 N KOH, bleached with alkaline 3% H_2O_2 and stained with trypan blue in lactophenol[8]. The percentage mycorrhizal infection of root and scale-like leaves was calculated[9].







Figures 1–4. Vesicular-arbuscular mycorrhiza in the roots and scale-like leaves of *Canna indica* L. **1.** Globose spore and subtending hypha in a scale-like leaf (× 120). **2.** Knobby appearance of hyphae in a scale-like leaf. (× 80). **3.** Vesicles within the cells of the root. (× 80). **4.** Vesicles, arbuscules and hyphae in a root. (× 40). 1. Vesicles, 2. arbuscules, 3. hyphae.

Spores, hyphae, vesicles and arbuscules appeared to be similar in the host plants examined. The fungus belongs to the genus *Glomus*[10]. Spores were globose and the subtending hyphae were simple (figure 1). Knobby appearance of hyphae is seen well (figure 2). Vesicles often formed within and conformed to the shapes of cells (figure 3). Small, poorly to nonstained lateral hyphae branched repeatedly and extensively colonized the surrounding host tissues as very fine threads and the presence of vesicles, arbuscules and hyphae is well documented (figure 4). The two cultivars did not differ significantly in their mycorrhizal infection (table 1).

As far as we are aware, this is the first report on the occurrence of VAM in roots and scale-like leaves of two cultivars of *Canna indica* L.

Table 1 *Per cent mycorrhizal infection in roots (and scale-like leaves) of two cultivars of Canna indica L*

Cultivars	No of segment/leaves Examined	+ve for VAM infection.	Infection %
Cultivar-1 (green leaved)	108 (108)	81 (76)	75 (70)
Cultivar-2 (brown leaved)	108 (108)	79 (74)	73 (68)

The values within parantheses are for scale-like leaves and those outside parantheses are for roots.

6 January 1986; Revised 11 Febraury 1986

1. Taber, R. A. and Strong, M. E., *Mycologia*, 1982, **74**, 152.
2. Dwivedi, R. S. and Pathak, S. P., *Indian Phytopathol.*, 1981, **34**, 524.
3. Taber, R. A. and Trappe, J. M., *Mycologia*, 1982, **74**, 156.
4. Stasz, T. E. and Sakai, W. S., *Mycologia*, 1984, **76**, 754.
5. Bagyaraj, D. J., Manjunath, A. and Patil, R. B., *Trans. Br. Mycol. Soc.*, 1979, **72**, 164.
6. Park, J. L. and Linderman, R. G., *Can. J. Bot.*, 1980, **58**, 1898.
7. Yeh, M. W. M., *Mycorrhizal fungi in roots of Texas crops*, Texas A & M University, Texas, USA, 1975, M.S., thesis, p. 73.
8. Bloss, H. E., *Mycologia*, 1982, **74**, 505.
9. Krishna, K. R. and Dart, P. J., *Plant* and *Soil*, 1984, **81**, 247.
10. Trappe, J. M. and Schenck, N. C., In: *Methods and principles of mycorrhizal research*, (ed.), N. C. Schenck, The American Phytopathological Society, USA, 1982, p. 1.

INTERACTION OF DIFFERENT SEED-BORNE FUNGI OF PEARL MILLET (*PENNISETUM AMERICANUM*) AND ITS EFFECT ON PATULIN PRODUCTION BY *ASPERGILLUS TERREUS*

S. GIRISHAM and S. M. REDDY
Department of Botany, Kakatiya University, Warangal 506 009, India.

THE interaction of different seed-borne fungi of pearl millet (*Pennisetum americanum*) and its effect on patulin production by *Aspergillus terreus* were studied. *Aspergillus parasiticus*, *A. niger*, *Curvularia brachyspora* and *Fusarium solani* were responsible for complete suppression of patulin production by *A. terreus*, while *A. ustus*, *A. deflectus* and *Drechslera rostrata* allowed *A. terreus* to produce patulin only in traces. *Aurobasidium pullulans* and *Trichoderma viride* which acted as strong inhibitors also suppressed patulin production. In general production of patulin by *A. terreus* decreased significantly in the presence of other fungi. Probably this may be the reason for the low incidence of patulin in nature.

Recently studies have been reported[1,2] on varied relation among the seed-borne fungi of maize and sesamum respectively and the possible control of aflatoxin production by some of these biocides. *Rhizopus oligosporus* is reported to inhibit the aflatoxin production *A. flavus* and *A. parasiticus*[3]. Hence, it was considered worthwhile to investigate the nature of interaction between *A. terreus* and spermosphere mycoflora of pearl millet and its impact on patulin production by *A. terreus*.

The relation between different seed-borne fungi of pearl millet (*Penisetum americanum*) and *A. terreus* was established by inoculating the buffered 2% malt extract agar (pH 6.0) with 25 different fungal species by pairing them separately with *A. terreus*. Each pair was inoculated over the agar surface maintaining equidistance to all test pairs. The plates were incubated at 27–29°C for 7 d. At the end of the incubation period the diameter of each fungus and relation between the two fungi was recorded. The relation between the two fungi was categorized into one of the following, as suggested by Johnson and Curl[4]. A—Mutual intermingling of the two organisms; B—Mutual inhibition on contact, the space between the two colonies is small, but clearly marked; C—Mutual inhibition at a distance; D—Inhibition of one organism on contact, the antagonist continues to grow, unchanged or at a reduced rate, through the colony of the inhibited