WAITEA CIRCINATA—A NEW FUNGUS CAUSING SHEATH BLIGHT ON RICE

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IN December 1982, the rice culture TNAU 4372 was found to show symptoms which resembled sheath blight at the Paddy Breeding Station of the Tamil Nadu Agricultural University, Coimbatore.

The symptoms are similar to sheath blight caused by *Rhizoctonia solani* Kuhn. The lesions are oval, irregular on the sheath of rice leaves, greenish brown in colour, measuring 2 to 4 cm long and 4 to 8 mm wide. Affected leaves dry up completely. In culture, the fungus is brown in colour with profuse fan-like growth and the width of hyphae ranged from 4.7 to 7 μ. Numerous minute, aerial sclerotia, oval to irregular in shape ranging from 267 to 856 μ in length and 215 to 480 μ in width, borne singly or in groups of 3 or 4, light brown in colour, were seen. No basidiospore formation was observed. The fungus was tentatively identified as *Waitea circinata* Warcup and Talbot by Dr J. E. M. Mordue and Dr B. C. Sutton of the Commonwealth Mycological Institute, Kew, Surrey, London. Their attempts also failed to produce the basidiospore in culture.

The pathogenicity of the fungus was also tested on rice plants by growing the fungus on rice sheath bits. After a 7-day growth the bits were inserted into the leaf sheath of rice plants and covered with moist cotton wool following the techniques of Venkata Rao and Kanniyan[1]. The fungus was found pathogenic to rice culture TNAU 4372. The formation of sclerotia helps in distinguishing this fungus from that of *Rhizoctonia solani* in culture. The sclerotia of *R. solani* are sparse or rare, comparatively big, globose with pitted exterior surface, chocolate brown coloured, measuring upto 5 to 6 mm in diameter.

This is the first report of this fungus on rice causing sheath blight disease.

We express our gratitude to Dr J. E. M. Mordue and Dr B. C. Sutton of the Commonwealth Mycological Institute, Kew, Surrey, London, for identification of the fungus.

8 November 1983; Revised 4 May 1984

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REGENERATION OF TEA SHOOTS FROM NODAL EXPLANTS IN TISSUE CULTURE

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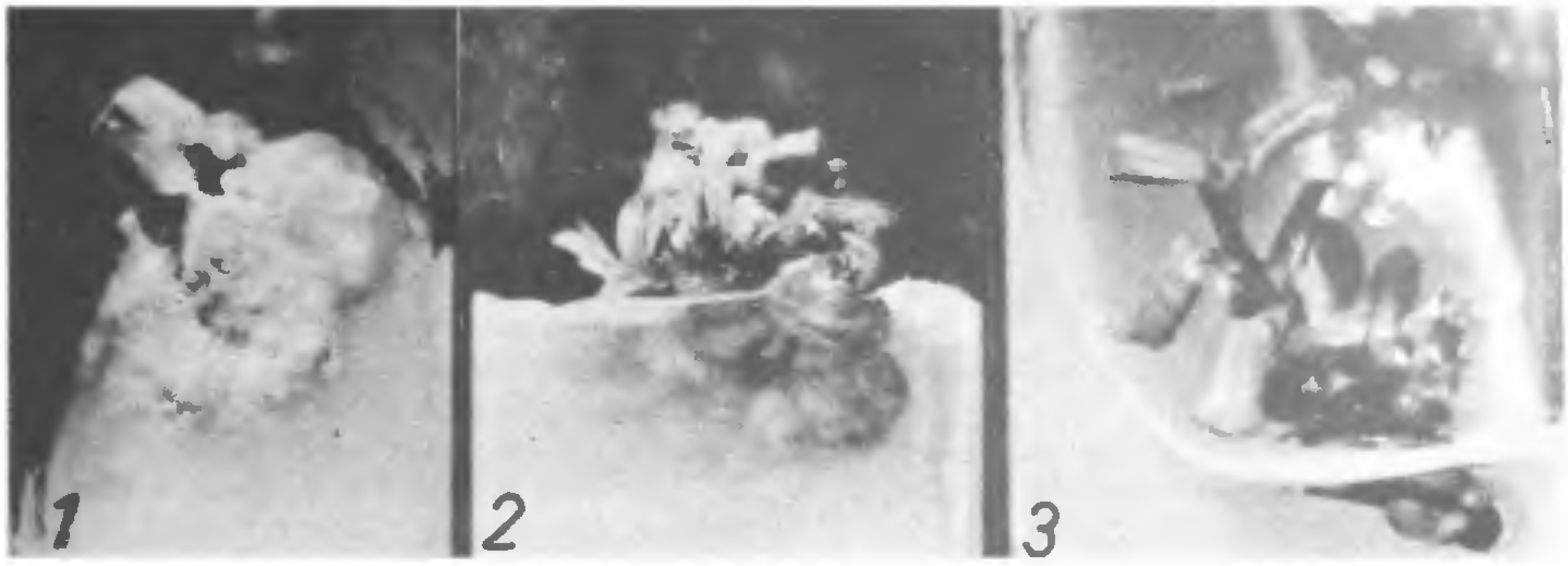
THE tea plant, *Camellia sinensis* (L.) O. Kuntz. is usually propagated vegetatively by rooting of cuttings, grafting and budding Quite often, the regenerated cuttings gradually lose their vigour in the long run, and if the source plant itself is infected, the cuttings also carry the disease.

Through tissue culture techniques it should be possible to obtain a large number of clonal plants from rare individuals of exceptional merit in a very short period of time. Moreover, they would be as vigorous as the seed plants and disease-free. Suitable mutants for disease resistance and for quality produce can readily be screened in a short time and space by cell and tissue culture techniques. There are only two earlier reports on induction of plantlets from cotyledon callus of tea[1,2]. Pollen embryoids and callus formation have also been reported in tea anther cultures[3,4]. In the present communication, the results of preliminary investigations on regeneration on shoot-buds from *in vitro* cultures of nodal explants taken from field-grown mature tea plants as well as from seedlings are reported.

Seeds and mature twigs of tea plants were obtained from Tea Research Association's Nagarkata Substation, West Bengal. Surface-sterilized nodal explants of mature twigs along with axillary buds, and of sterile seedlings and shoot-tip explants were aseptically cultured in Murashige and Skoog's[5] (MS) medium supplemented with 200 mg/l meso-inositol, 40 mg/l glycine, 10 mg/l each of pyridoxine-HCl and nicotinic acid, 1 mg/l thiamine-HCl and the following growth adjuvants: 0.1 % yeast extract, 10 % v/v coconut water, 2 mg/l naphthalene acetic acid (NAA) and 6 mg/l benzyl-aminopurine (BAP). In another set, 2 mg/l indoleacetic acid (IAA) and 8 mg/l kinetin (Kn), were used in place of NAA and BAP. Media were adjusted to pH 5, solidified by adding 0.7 % agar and sterilized by autoclaving. The cultures were incubated at 22–25°C under 16 hr photoperiod of 2000 lux light intensity (from Phillips' fluorescent lamps), at the level of the cultures.

Swelling was noted at the cut ends of nodal explants within one month of culturing in NAA + BAP medium.



Figures 1–. *Camellia sinensis* tissue cultures: **1.** Nodal segments of mature twig callusing (× 1.6); **2.** Callus showing shoots with expanded lamina and elongated internodes (× 1.6); **3.** Shoots formed directly on nodal segments of seedlings (× 1.1)

On subsequent sub-culturing in the same medium, the cells at the swollen region proliferated to form a pinkish callus (figure 1). In 2–3 months, 4–5 shoot-buds were formed in the pinkish callus. These shoot-buds could not develop beyond their rudimentary stage in the above medium, as well as in the one with reduced levels of NAA (1 mg/l) and BAP (3 mg/l). When they were subcultured on the medium with macro- and micro-salts reduced to half their full strength and with reduced levels of NAA and BAP, the shoot-buds showed elongation of internodes and expansion of leaf primordia (figure 2). Also, a few more shoot-buds were formed, increasing their number to 7–8 in each pinkish callus mass. However, in nutrient media containing NAA + BAP, nodal explants of sterile seedlings produced only a callus, with no organogenesis. In a parallel set containing 2 mg/l IAA + 8 mg/l Kn in place of NAA + BAP, 3–4 shoot-buds were formed within 2 months in each nodal segment, either of mature twigs or of sterile seedlings, without callusing. When the explants were grown in the above medium containing reduced levels of IAA (1 mg/l) + Kn (3 mg/l), the already initiated shoot-buds did not grow but when transferred to the medium along with macro- and micro-salts reduced to half their normal strength, they developed into shoots (figure 3). Of the nodal segments from the first to the fifth visible nodes, counted downwards from the shoot apex of sterile seedlings, the second one showed the best response. Shoot-tip explants of the sterile seedlings did not grow in any of the media.

It would thus be evident that the mode of regeneration of shoot-buds in the cultured explants depended mainly on the kind of growth regulators used. For instance, in the presence of NAA + BAP, the nodal segments from mature twigs produced callus showing the initiation of shoot-buds (*indirect* regeneration), whereas, in IAA + Kn medium, the shoot-buds were initiated directly from the cells of the explants without an intervening callus phase (*direct* regeneration). However, these shoot-buds failed to develop further in the presence of higher as well as lower levels of auxins and cytokinins in the nutrient media but they did develop into shoots when the levels of auxins, cytokinins, and of macro- and micro-salts were reduced simultaneously. This demonstrates that the developmental stages of rudimentary shoot-buds could be switched off not merely by reducing the levels of growth regulators, but also by reducing the levels of inorganic salts in the nutrient medium. It also becomes evident that the nutrient requirement for developmental stages of shoot-buds is more exacting and precise than for their induction. It has generally been observed that *direct* regeneration produces mostly clonal plants, whereas *indirect* regeneration can give rise to plants showing genetic variability. Both these types of plants are required for propagation and improvement of the tea plant.

MKP thanks the Tea Research Association, Jorhat, for financial assistance, and for supplying plant materials. Research facilities provided by Prof. A. K. Sharma, FNA, Department of Botany, University of

Calcutta, are gratefully acknowledged.

11 January 1984; Revised 30 April 1984

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A NEW SPECIES OF *PHAEOISARIOPSIS* FEBR.

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DURING a survey of fungi parasitizing phanerogamic flora of Gorakhpur region, an undescribed species of *Phaeoisariopsis* was collected on the leaves of *Costus speciosus* Smith, which is described and illustrated below:

Phaeoisariopsis costusae sp. nov.

Contagionis maculae amphigenae, griseae, orbiculares, usque 5 cm in diam.; coloniae hypophyllae, effusae, bissoideae, atra brunneae vel fuscae; mycelium ex hyphis immersis, subhyalinis vel pallide brunneis; stromata prosenchymatica, plus mimusve brunnea, usque 70 μm in diam.; conidiophora macronematica, synnematica ad basim, mononematica ad apicem, vulgo haud ramosa, plum septata, erecta vel flexuosa, pallide brunnea, laevia, tenue tunicata, geniculata ad apicem, 130–350 μm longa, 3–5 μm cr. ad basim (4–5.5 μm ad apicem); cellulae conidiogenae integratae, terminales, polyblasticae, sympodiales; cicatrices conidiales distincta, incrassata (usque 1.5 μm lata); conidia solitaria, sicca, acro vel acropleurogena, simplicia, haud ramosa, laevia, olivaceo brunnea, plus minusve cillindrica, vulgo curvata, 1–6 septata, rotundata ad apicem, mesurent 25–85 × 5–7 μm.

Hab. in foliis vivis *Costus speciosus* Smith (Zingiberacearum), leg. A. K. Singh in January 1980, Gorakhpur, KA-25, IMI Herb. No. 244879.

Infection spots amphigenous, greyish, orbicular, up to 5 cm in diam.; colonies hypophyllous, effuse, cottony, dark brown to blackish; mycelium immersed, subhyaline to light brown; stromata prosenchymatous, more or less brown, up to 70 μm in diam.; conidiophores macronematous, synnematous along the basal portion and almost mononematous towards apex, commonly unbranched, multiseptate, straight to flexuous, pale brown, smooth, thinwalled, geniculate at apex, 130–350 μm long, 3–5 μm thick at the base (4–5.5 μm at the apex); conidiogenous cells integrated, terminal, polyblastic, sympodial, cicatrized with distinct thickened scars (up to 1.5 μm wide); conidia solitary, dry, acro to acropleurogenous, simple, unbranched, smooth, olivaceous brown, more or less cylindric, mostly curved, 1–6 septate, rounded at the apex, measuring 25–85 × 5–7 μm (figures 1a, b, c).

On living leaves of *Costus speciosus* Smith (Zingiberaceae), leg. A. K. Singh in January 1980 from Gorakhpur, KA-25, IMI Herb. No. 244879.

The present fungus resembles *P. bambusae*[1] and *P.*

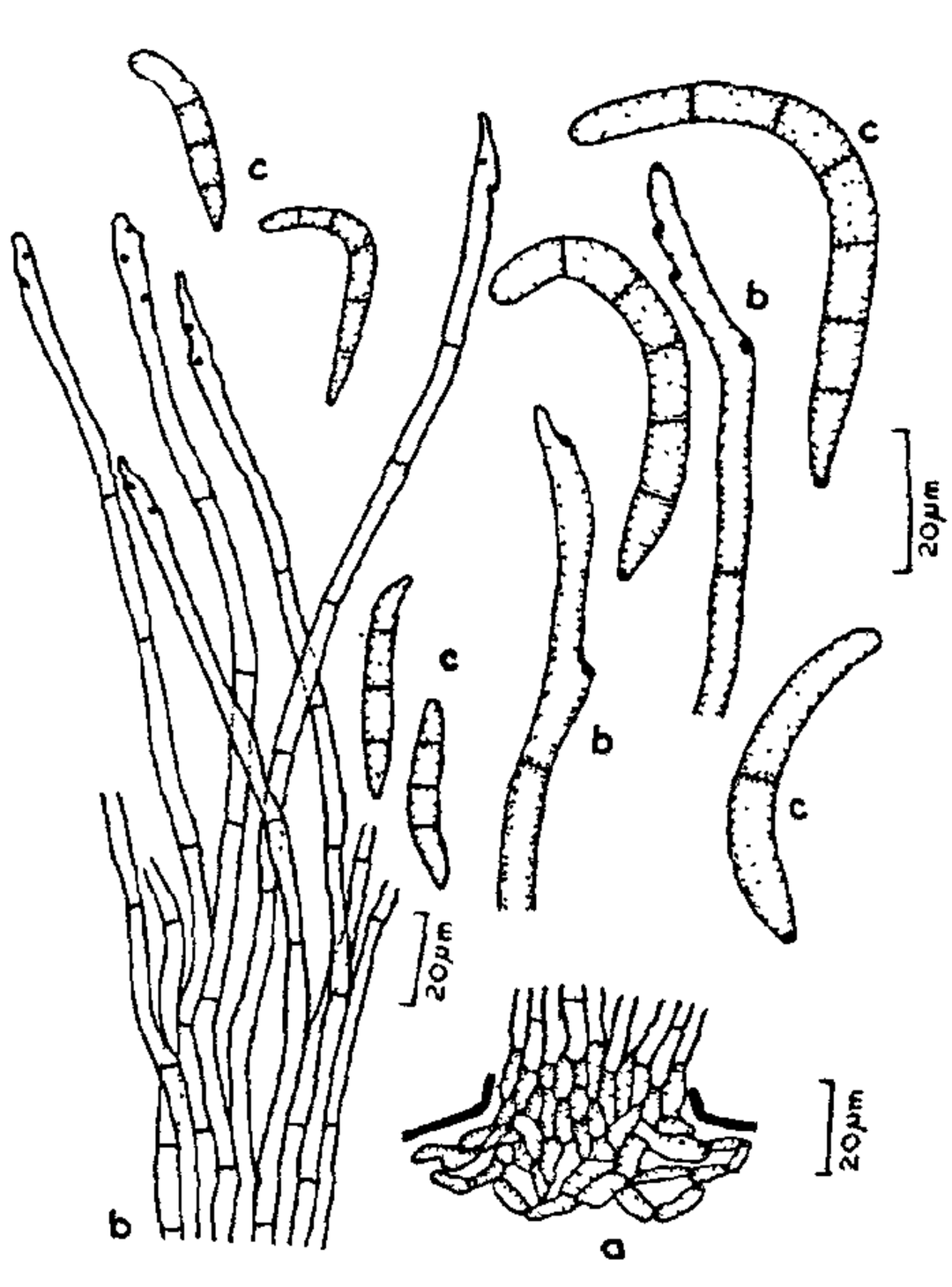

Figure 1. *Phaeoisariopsis costusae* sp. nov. **a.** Stroma, **b.** Conidiophores, **c.** Conidia.