

THE ANAMORPH OF *SARAWAKUS SUCCISUS* RIFAIMIEN A. RIFAI, KARTINI KRAMADIBRATA
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ABSTRACT

Single ascospore isolates of *Sarawakus succisus* Rifai produce a *Trichoderma* like anamorph. The hypocreaceous nature of the genus *Sarawakus* Lloyd is therefore indicated. A detailed illustrated description of this conidial state is presented.

ABSTRAK

Isolat askospora tunggal jamur *Sarawakus succisus* Rifai menghasilkan bentuk anamorf yang menyerupai *Trichoderma*. Kekekabatan marga *Sarawakus* Lloyd dengan suku Hypocreaceae dengan demikian diperkukuh. Pertelaan berjmban dan terperinci status kotidium ini disajikan.

In describing the ascomycete *Sarawakus succisus* Rifai, the desirability of bringing this species to culture was pointed out, hoping that the cultural characters would provide an additional taxonomic evidence for establishing the affinity of the genus *Sarawakus* Lloyd to the Hypocreaceae (Rifai 1969b). As was shown on that occasion, this extremely rare species was first collected in 1924 and subsequently in 1962, both in Bogor Botanic Gardens. We had been on the look out for fresh specimens of the species since 1969. During the bamboo growing season of February 1982, some of the shoot sheaths produced by the two oldest clumps of *Dendrocalamus giganteus* Munro — the same clumps from which most of the 1962 collections of *Sarawakus succisus* were made — were found bearing its stromata. In one of the shoot sheath which bore those stromata, accompanying colonies of a green hyphomycete were also observed. This opportunity was used to prepare ascospore cultures as well as the probable conidial isolates of this species.

The ascospores of *Sarawakus succisus* germinated readily in standard tap water agar, malt extract agar as well as in YPSS agar. The

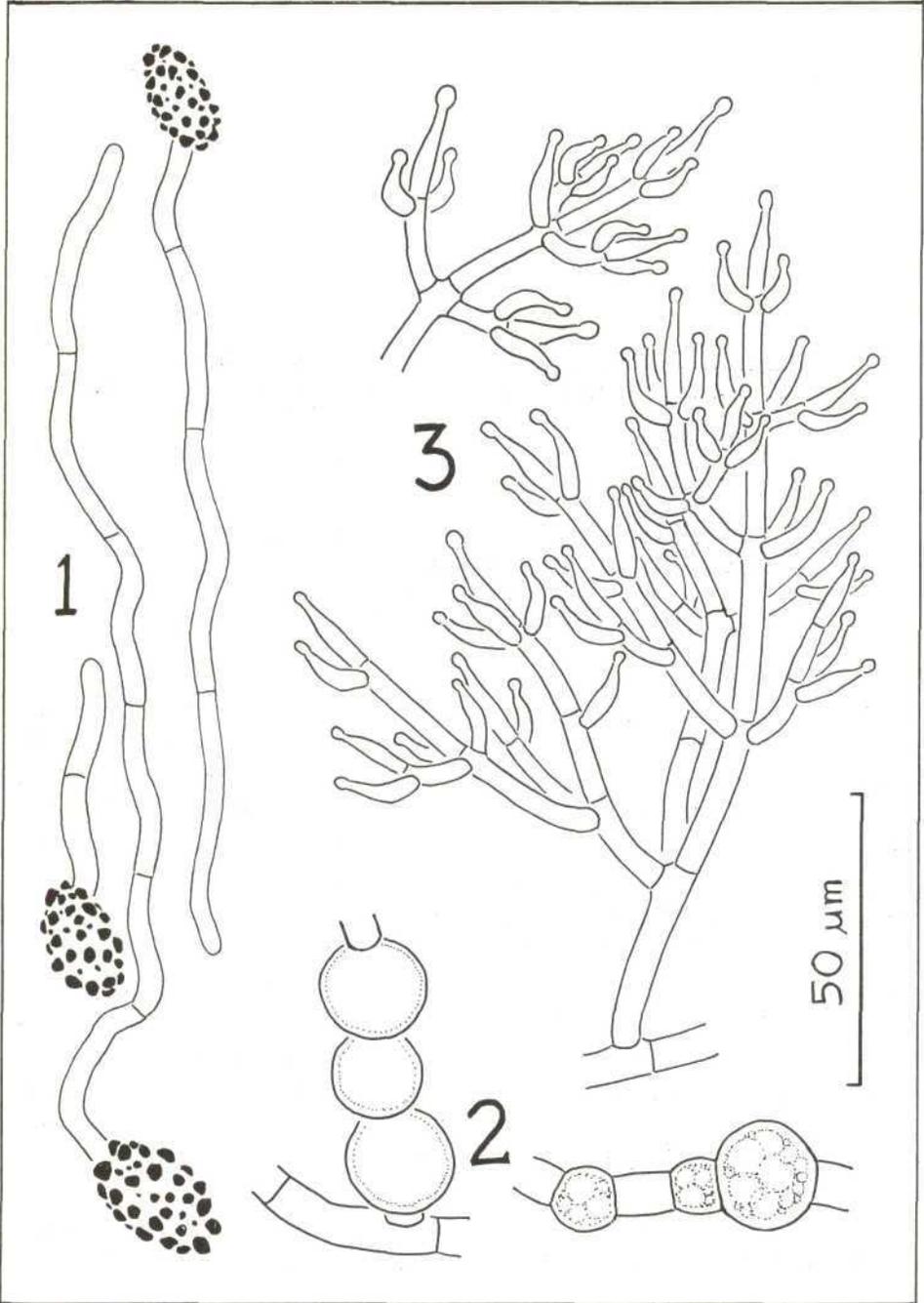


Fig. 1. -Germinating ascospores. 2. Chlamydozooids. 3. Conidiophores.

germination took place 16—24 hours after the ascospores were inoculated on the agar (Fig. 1). Germinated ascospores were picked up singly as well as in mass, and transferred on to fresh agar plates, followed by incubation at the room temperature. Daily observations on the single ascospore cultures thus obtained were made and it was noted that on the third or fourth day the colonies started producing conidiophores. These were studied and illustrated when young and the conidia produced were rather few (Fig. 3), because it turned out later that in the older cultures the branching systems of the conidiophores and the disposition of the conidiogenous cells were difficult to elucidate as are the case with those of species of *Trichoderma*.

On 2% malt extract agar colonies of *Sarawakus succius* grow slowly at room temperature and they form a smooth surfaced, watery white, sparse mycelial mat over the surface of the media, with aerial hyphae generally developing later towards the margin of the Petri dish. As the colonies grow older, the somewhat restricted but diffused conidial areas become slightly hairy, at first white and then gradually turn whitish green and ultimately the colonies appear dirty olive green or dark green, while their reverse become slightly yellowish-green. No odour is emitted by those colonies, even by the older cultures.

The mycelium forms a somewhat compact but sparse hyphal network. It is composed of smooth walled, hyaline, septate and much branched hyphae varying from 2.8 to 8.5 μm in diameter.

The chlamydospores are typically formed, mostly intercalarily or rarely in a terminal position, on a short, side branch of the submerged hyphae (Fig. 2). They are generally globose or sometimes subglobose, smooth and slightly thick walled, subhyaline to very pale green, and measure 11.7—16.4 μm in diameter.

The conidiophores are highly ramified and form loose, irregular and small tufts which are widely spread over the velvety and poorly defined ringlike conidial zones, or are more simply constructed and irregularly dispersed singly on aerial hyphae over the surface of the media. The main branches of the conidiophores are slender, with the basal diameter of about 5 μm . The main branches produce several shorter side branches the lengths of which gradually increase with the distance from the apex of their bearer. The side branches in turn put out further smaller side branches of their own and so on, resulting in a complicated but regular arborescent-type of branching system, especially since those side branches typically arise in groups of two or three (or rarely singly) just below the septa of their bearer. Unlike those

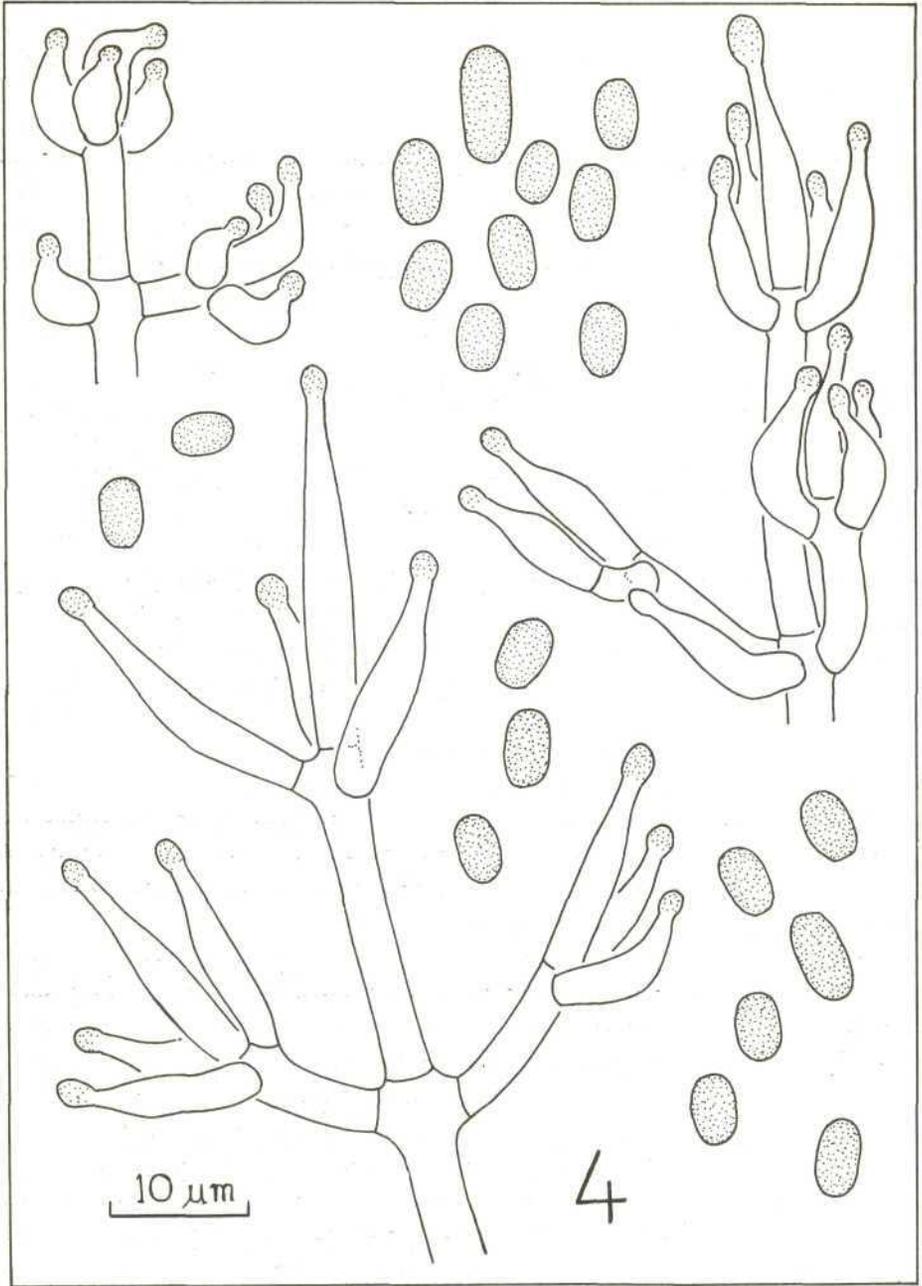


Fig. 4. Phialides and phialospores

found in most species of *Trichoderma*, these side branches form an almost regular whorl. Likewise they do not stand at a right angle, but rather incline towards the apex of their bearer. The ultimate apex of each side branch is invariably terminated by a conidiogenous cell.

The conidiogenous cells of the anamorph of *Sarawakus succisus* are phialades, which are nine-pin shaped and slender, with their lower half being almost cylindrical but gently narrower towards the base, swelling slightly above their middle and then distinctly attenuate towards the apex. Like the branches of the conidophores, the disposition of these phialides also incline toward the apex of their bearer and hence form a rather acute angle. They also arise in an almost regular whorl of two or three (rarely singly, but sometimes up to four) around the apex of the penultimate cell of the side branch of the conidophore just beneath the septa of the terminal phialides. These phialides are relatively long and measure $12.7 - 19 \times 2.2 - 3.5 \mu\text{m}$, but may be only up to $8 \mu\text{m}$ long while those that terminate the side branches of conidophores may reach $22.8 \mu\text{m}$ long (Fig. 4).

The phialospores are produced singly and successively and accumulated in a non-slimy globose conidial head at the tip of each phialide. Conidial heads from neighbouring phialides frequently come into contact and unite to form a common and larger conidial accumulation. The phialospores are mostly elliptic-subcylindrical or sometimes obovoid ellipsoidal, often with an almost truncate base and rounded apex. They are smooth walled, pale green when viewed singly under the microscope but appear much darker in mass and measure $4 - 6.2 (-8.2) \times 2.6 - 3.2 \mu\text{m}$ (Fig. 4).

Comparison between the single ascospore cultures and those derived from the conidia of the green hyphomycete colonies occurring naturally together with the stromata indicated that in all respects they were identical and hence represented the same species. The presence of this naturally occurring hyphomycete colonies suggest that *Sarawakus succisus* persist in nature (probably in the soil) in the form of its anamorph and only on a rare occasion this species forms the teleomorph. The rarity of this species can be explained further by the fact that its occurrence seems to be almost restricted to *Dendrocalamus giganteus*, a bamboo species not native to Java and is known in this island only in cultivation in botanic and experimental gardens.

From the above description, it is evident that the inclusion of the genus *Sarawakus* in the family Hypocreaceae (Rifai 1969b, Rogerson 1970) is supported by the nature of the anamorph of one of its species.

Diligent search for fresh specimen of the type species of the genus, *Sarawakus lycogaloides* (Berk & Br.) Lloyd has not been successful so that no information of its anamorph is available. It is of interest to note, however, that the anamorph of *Sarawakus succisus* is only remotely related to that of *Thuemenella britannica* Rifai & Webster (1965). On the other hand, it bears strong similarities to the anamorph of *Hypocrea hunua*, Dingy as illustrated by Rifai (1969a: 11, fig. 3) in size, shape and disposition of their phialides. The conidiophore branching systems are also similar. Moreover, in both species the conidiophores and phialides collapse in older cultures, as in typical representatives of *Trichoderma*. In view of the recent development in the taxonomic research of *Trichoderma* (Doi 1972, Bissett 1984) the time seems to have come to enlarge the scope of the genus *Trichoderma* to accommodate the anamorph of *Sarawakus succisus* and its related forms as well.

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