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Full Length Research Paper

Study of fungal diseases on medicinal plants of Betul forest with mycotaxonomic treatment

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Medicinal plants are widely used for treatment of diseases all over the world. According to world health organization report, about 80% of the world populations are taking interest in indigenous medicinal plants remedies. During frequent surveys for phytoparasitic foliicolous microfungi, interesting specimens were collected from Betul forest division of Madhya Pradesh, which upon detailed examination proved to be undescribed fungal taxa of hyphomycetes, namely, *Spiropes celastracearum* sp.nov. and *Ulocladium verruculosa* sp.nov., infecting the leaves of *Elaeodendron glaucum* Pers. (Celastraceae) and *Bauhinia purpurea* L. (Fabaceae) respectively. These have been compared with their allied taxa for showing their distinct identity.

Key words: Medicinal plant, Fungal diseases, hyphomycetes, mycotaxonomy, *Spiropes celastracearum*, *Ulocladium verruculose.*

INTRODUCTION

Elaeodendron glaucum Pers. is a medium sized tree which is distributed throughout India (the hotter part), Australia, America, South Africa and Tropical Asia. Therefore, in this context since no extensive work has been performed for possible hypoglycemic properties and antidiabetic potential of this plant, phytotherapy is considered to be minimum toxic or no side effects in comparison to modern allopathic medicines. Reports of ethnobotany suggested that about 800 medicinal plants possess antidiabetic potential (Lanjhiyana et al., 2011).

Bauhinia purpurea is a small to medium-sized deciduous fast-growing shrub or tree with a round, symmetrical, moderate dense crown to 10 m tall, young branches becoming glabrous or nearly so (glabrescent). In dry deciduous forests, the size is much smaller. In its natural habitat in Australia, china, India, Phillipines, the tree is deciduous. Throughout South-East Asia, various parts of numerous *Bauhinia* species are used in poulticing to reduce swelling and bruises, and to ripen ulcerations and boils. The bark is extensively applied in glandular diseases and as a poison antidote while the leaves are administered as cough medicine. It also shows Hepatoprotective potentials and aquas extract of *Bauhinia purpurea* against alcohol induced toxicity (Chaturvedi et al., 2011).

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***Spiropes* Ciferri (1955), *Sydowia*, 9:302-303**

***Spiropes celastracearum* sp.nov. (Figure 1, Plate 1)**

The lesions of this species are amphigenous, large, regular, light brown on lower surface, whereas the colonies are hypophyllous in small velvety, effuse, grey or black. Mycelium of hyphae is immersed, stroma nil, and sometimes represented by few cells, though setae and hyphopodia are absent. Conidiophores are mostly solitary, but sometimes in small groups they are macronematous, mononematous, erect, small (profusely branched and highly geniculate, thus representing denticles on the branches of conidiophore), straight to flexuous, highly geniculate, cicatrized, smooth, septate, and brown to light black (7.5-27.5 × 2.0-2.5 µm). Conidiogenous cells are polyblastic, integrated, terminal to lateral, percurrent, spherical to subspherical, generally light brown, conspicuous scars, and slightly dark. Conidia are solitary, acropleurogenous, vary in shape, clavate, obclavate, oval to cylindrical, and sometimes constricted

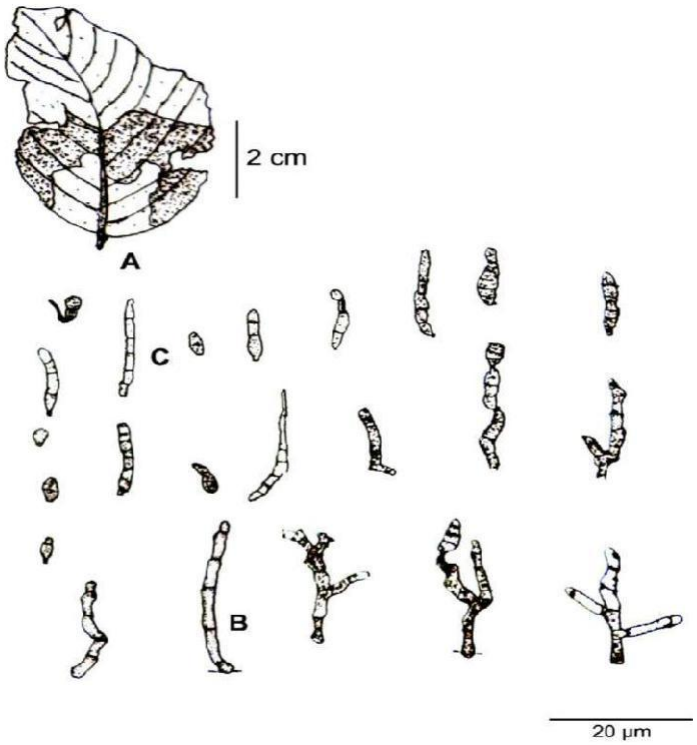

Figure 1. *Spiropes celastracearum* sp. nov. (A) Symptom, (B) Conidiophores, (C) Conidia.

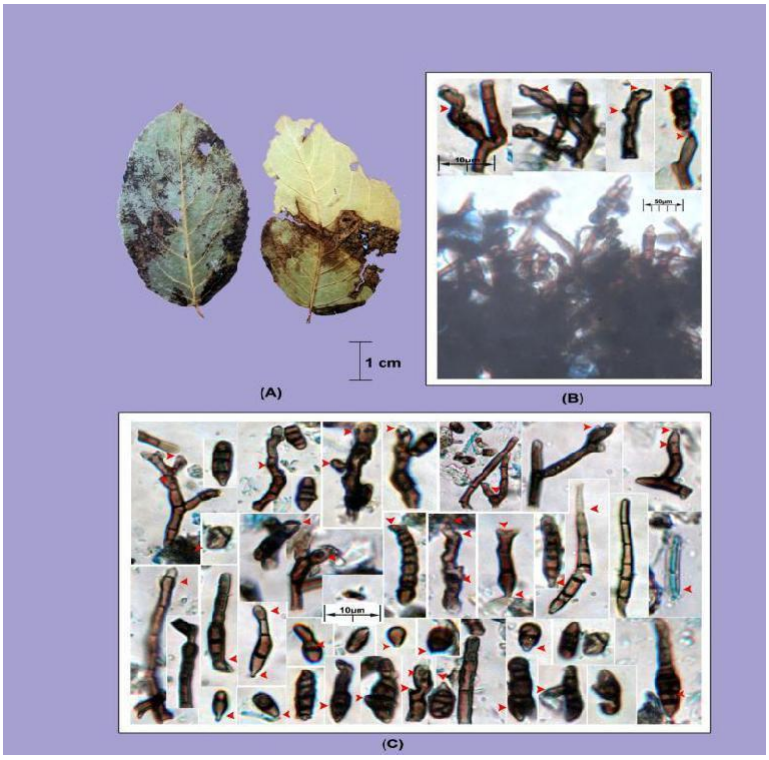

Plate 1. *Spiropes celastracearum* sp. nov. on *Elaeodendron glaucum* Pers. (A) Symptom, (B) and (C) Stroma, conidiophores and conidia (×500).

Table 1. Comparative account of *Spiropes celastracearum* sp. nov. with allied taxa.

Species	Spots and Colonies	Stromata	Conidiophores			Conidia		
			Structure	Colour and Septation	Size (in µm)	Structure	Colour and Septation	Size (in µm)
S. capinsis (Thüm.) M.B. Ellis (1968).	Colonies are dark blackish brown to black, hairy.	-	Arising singly or in groups, sometimes in very large groups of 100 or more, straight to flexuous.	Brown to dark brown, paler near the apex, well defined conidial scar.	500 long, 6-8 thick.	Straight or curved, fusiform to obclavate, smooth.	Subhyaline to brown, with 3-6 (usually 4 or 5) transverse pseudosepta.	38-67 (50) long, 6-11 (8-4) thick in the broadest part.
S. celastracearum (Proposed taxon).	Lesions amphigenous, large, regular, light brown on lower surface. Colonies are hypophyllous in small velvety, effuse, grey or black. Mycelium of hyphae are immersed.	Nil, and sometimes represented by few cells.	Mostly solitary, sometimes in small groups macronematous, mononematous, erect, small (profusely branched and highly geniculate, thus representing denticles on the branches of conidiophore), straight to flexuous, highly geniculate, cicatrized, smooth.	Brown to light black, septate.	7.5-27.5 × 2.0-2.5.	Solitary, acropleuro-genous, various in shape, clavate, obclavate, oval to cylindrical, sometimes constricted at septa, straight or curved, geniculate, smooth few conidia are fragmenting.	Olivaceous to black, 0-10 septate, vertical and longitudinal septa present, a few conidia are closely pseudo-septate.	3-10.5 × 2-21.5.

at septa. They are straight or curved, geniculate, olivaceous to black, and smooth (0-10 septate) with vertical and longitudinal septa present. A few conidia are closely pseudoseptate, while some other few are fragmented (3-10.5 × 2-21.5 µm) with an obtuse apex.

The living leaves of *Elaeodendron glaucum* Pers. (Celastraceae) were obtained in January 2010 at Betul Bhainsdehi South Forest Division, Madhya Pradesh, India (leg. R.S. THAKUR S.U. Herb No. RS-BOT-408 Holotypus, Isotypes 51478A).

A detailed study of the literature on fungus genus *Spiropes* revealed that *S. capensis*, Shaw (1984) is the only species described on the host family Celastraceae. It is evident from the tabular data that the present taxon at one hand shows some very minor closeness but on the other hand, it clearly shows dissimilarities in the size, shape of conidiophores and septation of conidia. It also noted that the conidiophores proposed taxon is dissimilar due to the fact that geniculate conidiophores are highly geniculate with large conidial variation. It was also found that no *Spiropes* species has been described before now on this host in question. The foregoing discussion clearly justifies its disposal as a new taxon of species rank (Table 1).

***Ulocladium* (Preuss 1851)*, Linnaea,* 24: 111**

***Ulocladium verruculosa* sp.nov. (Figure 2, Plate 2)**

The colonies of this species are hyphophyllous, small velvety, effuse, grey to black. Mycelium of

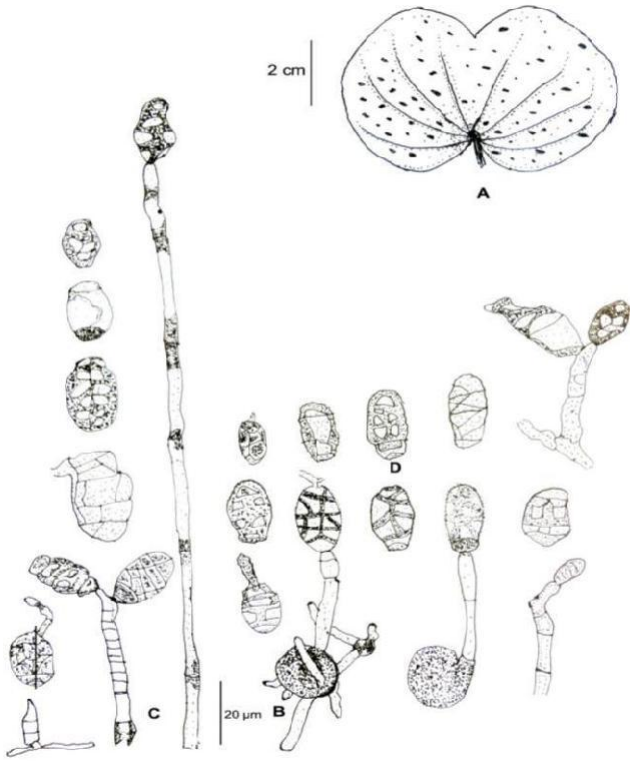

Figure 2. *Ulocladium verruculose* sp. nov. (A) Symptom, (B) Conidiophores in loose fascicle (×500), (C) Conidiophores (×500), (D) Conidia (×500).

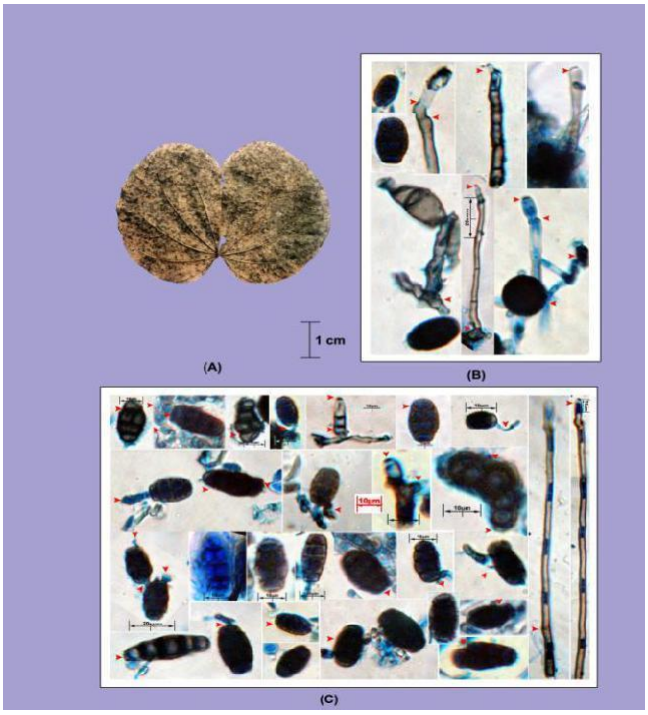

Plate 2. *Ulocladium verruculose* sp. nov. on *Bauhinia purpurea* L. (A) Symptom, (B) and (C) Stroma, conidiophores and conidia (×500).

Table 2. Comparative account of *Ulocladium verruculose* sp. nov. with allied taxa.

Species	Spots and Colonies	Stromata	Conidiophores			Conidia		
			Structure	Colour and Septation	Size (in µm)	Structure	Colour and Septation	Size (in µm)
U. atrum Khare, M.N. (1991).	Colonies effuse, brown, olivaceous brown, dark blackish brown or black. Mycelium partly superficial, partly immersed.	Stroma none. Setae and hypho-podia absent.	Macronematous, mononematous, unbranched or branched, straight or flexuous, often geniculate.	Pale to mid brown, smooth or verru-culose.	120 × 3-4.	Solitary, straight to flexuous, variable in shape but often obclavate.	Golden brown to dark reddish brown, verrucose, sometime ellipsoidal or obovoid, 1-3 transverse septa and 1 or more longitudinal septa	15-32 × 11-18.
U. chartarum (Preuss) Simmons (1967).	Black or olivaceous black.	-	Erect, straight or flexuose, often somewhat geniculate, mostly unbranched and smooth walled.	Golden brown.	Up to 50 × 4-5.	Scars brown. Conidia commonly in chains of 2-10, ellipsoidal or obovoidal, often with short beaks, medium Often secondary conidiophores present on conidia.	Brown to olivaceous, finally black, verrucose, with 1-5 (commonly 3) transverse and several oblique or longitudinal septa.	18-38 × 11-20.
U. consortiale (Thüm.) Simmons, (1967).	Mycelium pale yellow-brown, smooth or somewhat minutely echinulate, septate, 3-5 µm diam.	-	Erect, ascending, simple or branched, smooth-walled, or minutely roughened in parts adjacent to the vegetative mycelium.	Trans-lucent pale olive-ceous brown to brown.	4-5 wide, up to about 60 long.	Variable in shape from subspherical, elliptical, sub-cylindrical to rhomboidal, usually smooth, indistinctly roughened, or rarely definitely verrucose; base initially conical or rounded, apex narrowly to broadly rounded.	Dilute to medium olive-brown, with 1-5 transverse and 1 -6 longitudinal or oblique septa.	(16-) 18-30 (-34) × (7-) 10-15.
U. verruculose (Proposed taxon).	Colonies hyphophyllous, small velvety, effuse, grey to black. Mycelium of hyphae Mostly half immersed and rarely half superficial.	Stroma absent, pseudostromata are rarely present.	Macronematous, mononematous, erect to suberect, small to long, branched, minutely geniculate with small swellings on the branches of conidio-phores, cicatrized, smooth, septate.	Brown to light black.	12.5-174.5 × 2-3.	Solitary, catenate 0-1 in chain, acropleurogenous, various in shape (ellipsoidal to obovoid to oval), curved apex spherical.	Hyaline to olivaceous to dark black, smooth to verrucose, 2-4 septate, vertical and longitudinal septa presen.	10-26 × 4.5-14.

are absent, while pseudostromata are rarely present, but setae and hyphopodia are absent. Conidiophores are macronematous, mononematous, erect to suberect, small to long, branched, minutely geniculate with small swellings on their branches; however, they are cicatrized, smooth, septate, and brown to light black (12.5-174.5 × 2-3 µm). Conidiogenous cells are polyblastic, integrated, terminal, and percurrent. Generally, their scars are conspicuous, and small to medium dark. Conidia are solitary, catenate (0-1 in chain), acropleurogenous, and they vary in shape (ellipsoidal to obovoid to oval), in that some are curved, hyaline to olivaceous to dark black, and smooth to verrucose (2-4 septate). However, vertical and longitudinal septa are present (10-26 × 4.5-14 µm), and their apex are spherical.

The living leaves of *Bauhinia purpurea* L. (Fabaceae) were obtained in August 2011 at Betul Genral South Forest Division, Madhya Pradesh, India (leg. R.S. THAKUR S.U. Herb No. RS-BOT-786 Holotypus).

A survey of literature reveals that the present collection is comparable to *U. atrum*, Khare (1991), *U. chartarum* (Preuss) Simmons (1967), and *U. consortiale* (Thüm.) Simmons (1967), which are described on the host family, Fabaceae (Table 2). This is apparent from the table that the present collection is at greater divergence in the structure and colour of conidiophores and conidia

(brown to black conidiophores and hyaline conidial variation).

The tabular data show that the proposed taxon can, in no way, be accommodated with any earlier described species and demands its rank as a new species of *Ulocladium*. It can also be mentioned that no *Ulocladum* species has earlier been described on the new host.

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