J Indian bot Soc Vol 77 (1998) 47-52

OBSERVATIONS ON THE PATHOLOGICAL PROBLEMS AND ASSOCIATED MYCOFLORA OF CERTAIN IMPORTANT MULTIPURPOSE TREES OF PUNJAB-II

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(Accepted June, 1998)

Fungal diseases of important trees of Sangrur and Patiala districts of Punjab are enumerated. Morphology of fungus, symptoms on host and period of collections are described.

Key Words: Multipurpose trees, Mycoflora, Tree diseases.

Based on extensive forest diseases survey, conducted by the authors, in the Sangrur and Patiala districts of Punjab, certain fungal species causing various types of diseases on *Azardirachta indica, Bauhinia purpurea, Cassia javanica, Dalbergia latifolia, Grevia optiva, Melia azadarach* and *Syzygium cumini* are reported in this paper. A similar account of the diseases reported on *Acacia nilotica* and *Albizia lebbek*, has been reported in an earlier communication by the authors. (Dargan and Dulat 1993).

OBSERVATIONS

AZADIRACHTA INDICA A. Juss. (Vern. Neem)

It is a large, glabrous evergreen tree with pinnate leaves, crowded towards the end of the branches. It is native of Burma but grows all over India. In Punjab it is planted on the road sides and edges of the farm fields. It is an important Multi Purpose Tree Species, the oil cake obtained from the seeds is used as fertilizer and manure. Leaves are used as insecticides. Leaf extract is used in tooth pastes and soaps. The seed oil is used as an antiseptic. The ripe fruits are also edible.

During the present investigation, the following disease was observed on the folliage of the trees.

Alternaria alternata (Fr.) Keissler Beih-Bot. 26 1 29: 434.1912.

Plate: 1, Figs 1-2.

(Deuteromycotina, Moniliales, Dematiceae)

Disease : Leaf spot

Symptoms : Circular to irregular, well defined pale yellow to dark brown usually concentric spots with creamish margins, spots more prominent on upper leaf surface.

Morphology of Fungus: Hyphae light brown, septate, branched upto 3.2 µm in diameter, thin walled, conidia light brown, smooth, obclavate, generally beaked, beaks conical or cylindrical with rounded ends, 3-7 transverse septa, 1-4 longitudinal septa and 0-3 oblique septa, 25.2-46.2x8.4-16.8 µm, usually formed singly.

Collection Examined : Sangrur : Village Sohian nursery, Amritbir 1933 (PUN), On living Leaves of *A. indica*, May 12, 1991.

The present report of the fungus is a new host record and is also for the first time from Punjab State.

BAUHINA PURPUREA L. (Vern. Camel's foot tree, Lal Kachnar)

It is a medium sized deciduous tree, bark of which is ashy to dark brown, nearly smooth, leaves clefted half way down into two rounded lobes. The bark is used for dying and tanning and the bast for fibers. Flower buds and fruits are used as vegetable and the leaves for fodder. Often grown in gardens or on road side in Punjab.

Ganoderma lucidum was found associated with the tree during the present study.

Ganoderma lucidum (Leyrs.) Karst. Rev. Mycol III 9: 7 1881.

Plate: 1, Figs 3-6.

Received September, 1997

(Basidiomycotina, Aphyllophorales, Ganodermataceae)

Disease : Root rot, White spongy rot.

Symptoms: General wilting of the tree leading to complete mortality. Sporophores of the fungus present at the base of the tree, attached to the root.

Morphology of the Fungus: Sporophores stipitate, corky, becoming woody later, 4-10.8 x 5-8 x 3-4 cm; stalk lateral to central, varnished, reddish brown, shiny, encrusted, cylindrical, upto 12 cm long and 3 cm thick; upper surface shiny reddish brown with laccate crust, smooth, zonate, margin thick and white; context dark brown to light brown, upto 2 cm thick, hymenial surface white when fresh, light yellowish-brown when dry,pores small, rounded, 180-230 x 120- 165 µm, pore tubes upto 3.2 mm long; basidia clavate, flattened 16-20 x 7-8 µm; basidiospores dark brown, broadly ellipsoid, truncate at one end, thick-walled, outer wall smooth, inner wall echinulate 8.0 - 12.0 x 6.2 - 8.5 µm hyphal system trimitic. Skeletal hyphall brown, aseptate, unbranched upto 5.0 µm broad; generative hyphae pale brown thin walled, septate, with clamps, upto 4.7 µm broad; binding hyphae pale brown, profusely branched, thick walled, abundant upto 2.3 µm broad.

Collection Examined : Patiala: Punjabi university campus. Amritbir 1932 (PUN), at the base of the dying tree of *B. purpurea,* August 22, 1991.

The fungus has been previously reported in association with a number of trees all over India causing white spongy rot. However, on *B. purpurea* it is reported for first time and thus is a new host record of the fungus.

CASSIA JAVANICA L. (Vern. Java Cassia, Java Ki Rani)

It is a small tree with pinnate leaves. Flowers are pink and fragrant. This is native of Malaya but also planted in India along road side for shade and in gardens for its pink flowers. Also used as fodder and fuel wood.

C. javanica is colonized by number of fungal species in India (Bilgrami *et al.*, 1991). During the present investigation, three fungal species were collected from the infected stem of the tree species.

1. *Phellinus contigua* (Pers. :Fr.) Karst. Hattsv. 2: 82, 1882.

(Basidiomycotina, Aphyllophorales, Polyporaceae)

Plate: I Figs 12-14.

Disease: White fibrous rot.

Symptoms: Coffee brown effused sporophores on the dead stump as well as living stem of *C. javanica.* Infected wood turns brittle and shows yellowish-white fibrous rot.

Morphology of the Fungus: Sporophores broadly effused, inseparable from the wood when dry, velvety to touch when fresh, rigid and woody when dry, upto 3 mm thick,margin not different from pore surface; hymenial surface coffee brown, pores 3-5 per mm, almost rounded, 126-155 x 105 - 134 µm, pore tubes stratose, each layer 1.5-2 mm thick, setae subventricose, with pointed tips, dark brown, thick-walled, 11.2-25.6 x6.4 - 14.4 µm, protruding above the hymenium into the tubes, not abundant; basidia hyaline clavate, upto 3.5 µm broad; basidiospores dark brown, thick walled 4.8 - 6.4 x 40 - 4.8 µm, subglobose apiculate, hyphal system dimitic, skeletal hyphae yellowish brown aseptate, unbranched, thick walled with narrow lumen, 2.5 - 3.2 µm in diameter, generative hyphae pale brown, septate, unbranched, thin walled 2.4 - 2.8 µm in diameter, without clamps.

Collection Examined: Patiala: Punjabi university campus, Amritbir 1934 (PUN), on dead stump as well as living stem of *C. javanica.*, Oct. 12, 1991.

The species has been previously reported from South India, infecting hard wood species. However, there is no previous report of its occurrence on *C. javanica* from India. It is also new report for Punjab.

2. *Schizophyllum commune* Fr. Obs. Mycol. 1: 103. 1815

Plate: 1 Figs. 10.11.

(Basidiomycotina, Aphyllophorales, Schizophyllaceae)

Disease: Wood rot (Hawksworth *et al.*, 1983)

Symptoms: Small white basidiocarps present on the bark as well as exposed heart wood on the stem. No other visible symptoms on the host.

Morphology of the Fungus: Basidiocarps fan shaped, 0.3 - 1.8 x 1.0 - 1.5 cm, white, hard and corky

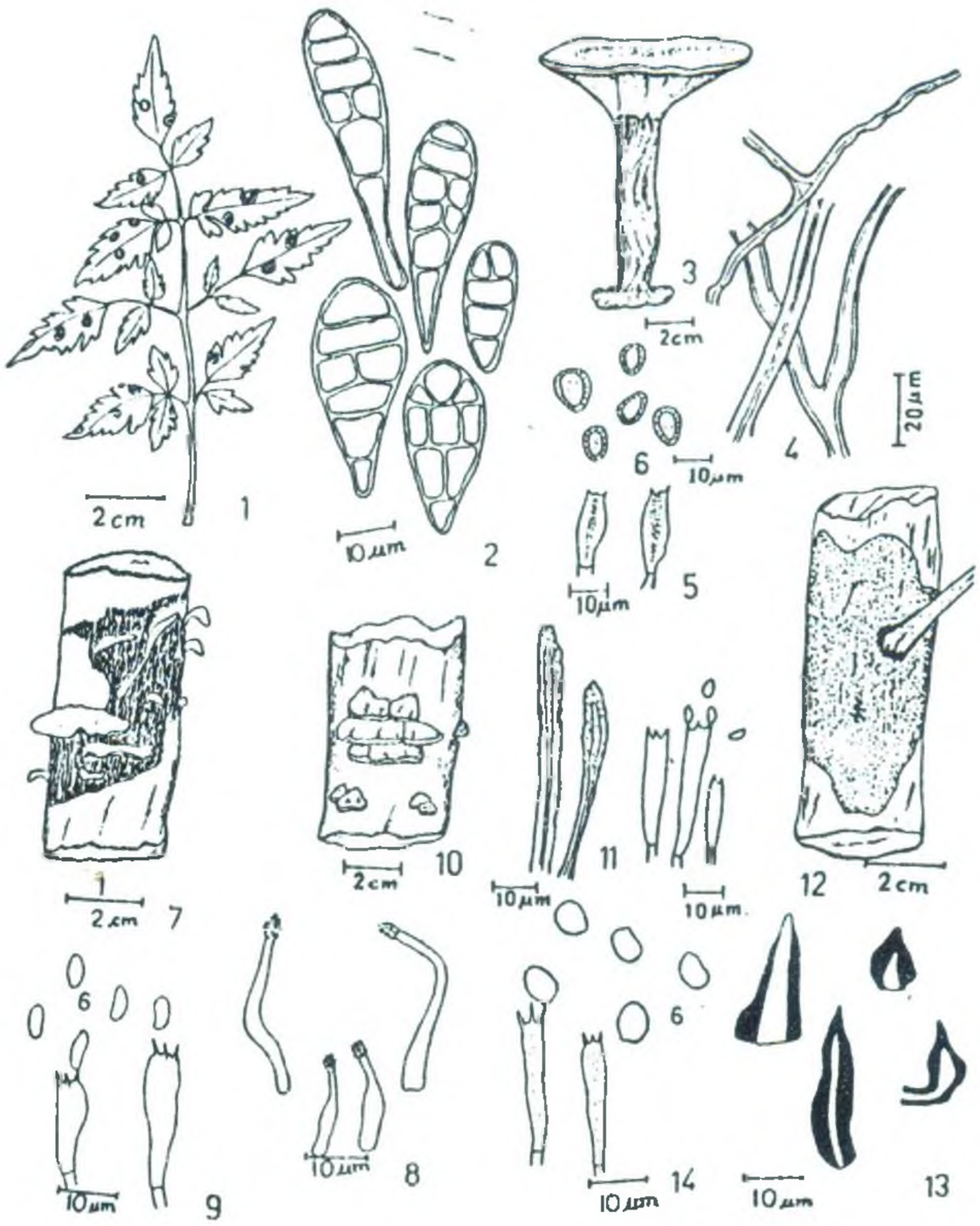


Plate I. Figs. 1-2 *Alternaria alternata* 1. Symptoms on leaves 2. Conidia, Figs 3-6 *Ganoderma lucidum* 3. Sporophore 4. Hyphal System 5. Basidia 6. Basidiospores Figs 7-9. *Trametes ravida* 7. Sporophore 8. Cystidia with encrusted tips 9. Basidia and basidiospores Figs 10, 11 *Schizophyllum commume* 10. Sporophores general habit 11,encrusted cystidia and basidia with basidiospores Figs. 12-14. *Phellinus contigua* 12. Sporophore general habit 13. Setae 14. Basidia and basidiospores.

when dry, generally solitary, some times in small groups, mostly sessile,attached to woody substratum by a broad base, sometimes stalked, tomentose, white when fresh as well as on drying, the margins turn inward on drying, lower surface light brownish-grey possessing lamellate gills at different length and depths, radiating towards the margin, longitudinally splitting into two halves which curl outward on drying, context light brown. Hyphal system dimitic, skeletal hyphae hyaline, unbranched, 6.8 µm brown, thick-walled, generative hyphae pale, branched, septate, with clamps, upto 5.2 µm broad; cystidia elongated encrusted, hyaline measuring 56 - 65.6 x 6.8 µm; basidia hyaline 20.0 - 28.0 x 3-6.2 µm with 4 sterigmata; basidiospores, 6.4-6.6 x 3.2-35 µm, hyaline oval in shape.

Collection Examined: Patiala: Plant conservatory, Punjabi university, Amrtibir 1935 (PUN), on stem of living *Cassia javanica* tree. Oct. 12, 1991.

The species has been previously reported on various angiospermous hosts from India (Bilgrami *et wl.*, 1991). However its occurrence on *C. javanica* is a new host record for the fungus.

Trametes ravida (Br.) Pilat Alt. Polyp. 272, 1939

(Basidiomycotina, Aphyllophorales, Polyporaceae)

Plate: 1 Figs. 7-9.

Disease: White spongy rot.

Symptoms: Effuso-reflexed, white sporophores, becoming reddish-brown at places, present on living stem. The infected wood gave whitish appearance and showed clear sings of rot.

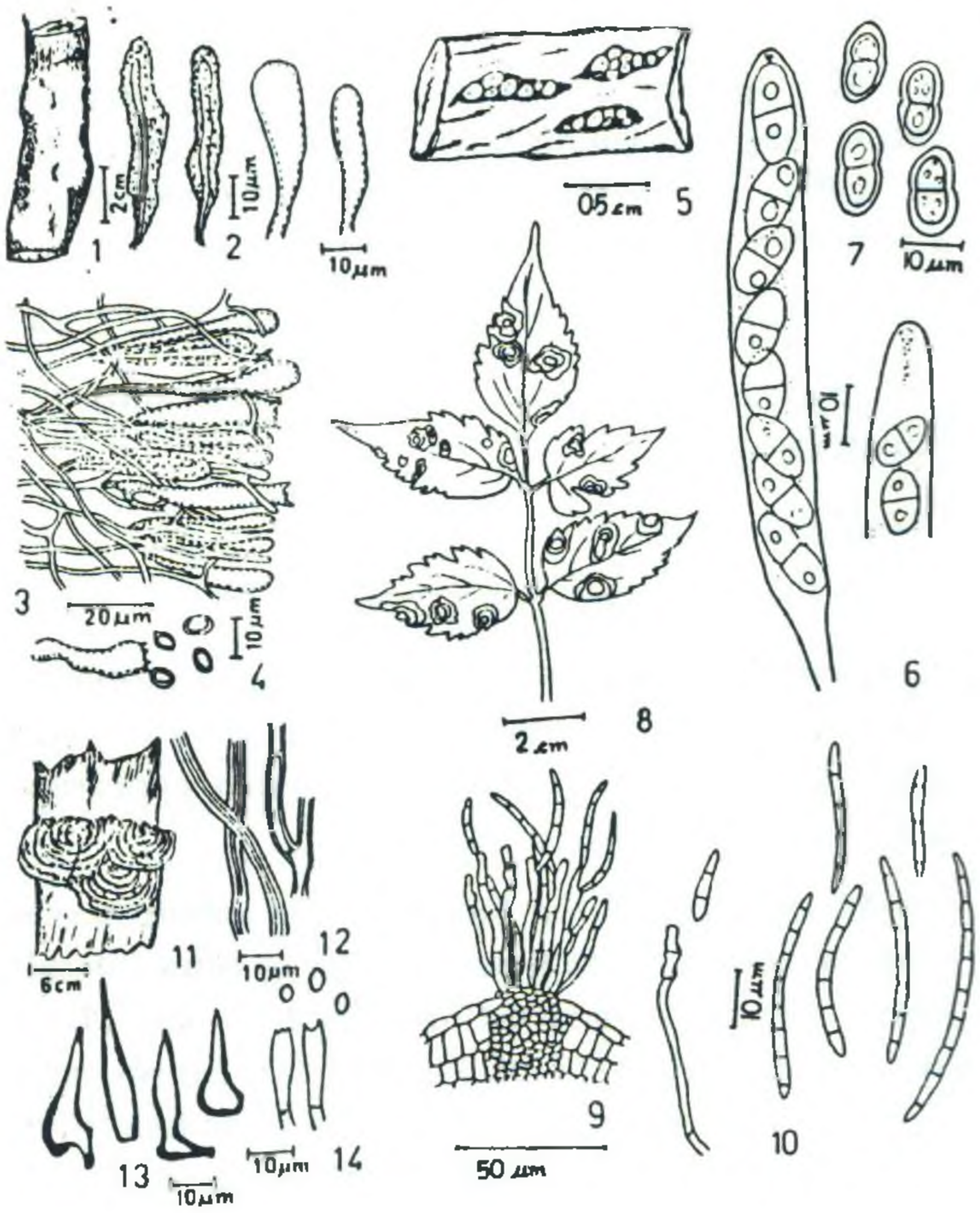
Morphology of the Fungus: Sporophore sessile, effuso-reflexed, sometimes adjoining pilei laterally fused, attached by a broad base, fiexible when fresh, rigid when dry, 0.3-0.7 x 0.2-15.0 x 0.3-1.0 cm, upper surface white when fresh, becoming reddish brown at places when dry, uneven, azonate, margin thinning out, incurved when dry. Context creamish white, hymenial surface white when fresh, turning straw coloured when dry, pores nearly rounded to elongated 1-4 per mm, usually extending upto the margin, pore tubes 2-3 mm long, pore size 14.4-35.2x12.8-16.0 µm. Basidia hyaline, clavate,12.0-14.4-4.0-5.8 µm, sterigmata hyaline, upto 2.4µm long, basidiospores hyaline,thin walled, oblong-ellipticle, guttulatc, 4.8-7.7x2.8-3.2 µm; cystidia abundant,embedded as well as projecting beyond the hymenium, hyaline, fusiform, capitate, encrusted. Skeletal hyphae pale, unbranched aseptate, thick-walled, 3-5 µm in diameter, binding hyphae hyaline, septate, highly branched, thin walled, 2.4-3.2 µm in diameter.

Collection Examined: Patiala: Punjabi university campus, Amritbir 1936 (PUN), On stem of living tree of *C. javanica.* August 10, 1991.

The fungus has generally been reported on stumps and logs of conifers and rarely on hard woods (Baksihi 1971). There is no previous report of the fungus from Punjab and also it is a new host record.

DALBERGIA LATIFOLIA Roxb. (Vern. Indian rosewood, Kala Shisham)

The tree mainly found in Bengal, Bihar and Madhya Pradehs. It is a tree much resembling the



Palte II Figs 1 *Scytinostroma cystidiatum* 1. Sporophore general habit 2. Encrusted cystidia and basidioles 3. Part of section of hymenium 4. Basidia and basidiospores. Figs 5-7. *Nectria coccinea* 5. Stromata general habit 6. Ascus and Ascal tip magnified 7. Ascospores Figs 8-10, *Cercospora subsessilie* 8. Symptoms on leaves 9. Section of aceruvlus showing conidiophores and conidia 10. conidiophores and conidia Figs. 11-14 *Fomes Linteus* 11. Sporophore 12. Hyphae 13. Setae 14. Basidia and basidiospores.

sisso but with smoother stem, longer leaf rachis, obtuse leaflets and broader pods. Planted occasionally in gardens.

During the present investigation, only one fungus, *Scytinostroma cystidiatum* was found associated with the tree.

Scytinostroma cystidiatum Boidn. Bull Jard. Bot. Etat. Brux 30:285 1960.

Plate II, Figs. 1-4

(Basidiomycotina, Aphyllophorales, Hymenomycetes)

Disease: Heart rot.

Symptoms: Heart wood shows signs of rotting. Since the sap wood is not affected, the living tree shows healthy appearance. Frutifications develop on wounded exposed heart wood.

Morphology of the fungus: Frutifications resupinate membranous, adnate, widely effused, upto 580 µn thick in section; hymenial surface white to cream, smooth to somewhat tuberculate, not creviced margin thinning, paler concolorous, adnate; context subhyaline in section, composed of compactly arranged hyphae; cystidia 35.2-50.0x5.6-6.4 µm, cylindrical to subfusiform, often arising from different parts of the context, immersed, heavily encrusted all over except at the base, incrustations subhyaline and soluble in 10% KOH solution, the walls thick subhyaline, hyphal system dimitic, skeletal hyphae 1.5-2.5 µ wide, irregularly and dichotomously branched, non septate, walls subhyaline, thick, dextrinoid and cyanophilous; generative hyphae 1.5-3.0 µm wide, branched, septate, clamps absent, walls subhyaline, thin, non dextrinoid and acyanophilous. Basidia 24-30 x 7.2-8.0 µm, utriform, 4-spored, sterigmata upto 3.2 µm long, basidiospores 4.4-5.1 x 3.2-3.5 µm globose to subglobose, shortly apiculate, walls smooth, subhyaline, dark brown, amyloid.

Collection Examined: Patiala: Punjabi university campus, Amritbir 1945 (PUN), On exposed heartwood of living tree. August 10, 1991.

The species has been previously reported from Punjab by Rattan (1977) at root stock of *Principia* sp. from Pathankot. Its occurrence on *Dalbergia latifolia,* however, is new host record.

GREWIA OPTIVA Drumm. (Vern. Behel, Dhaman, Biul)

A small tree with ashy white bark, young shoots stellate-tomentose. Leaves ovate, margin glandular-crenate. Flowers yellowish-red. This tree is found in submontaneus parts of Punjab. Its wood is used for golf shafts, fruits are edible and also used for fodder.

During the present survey *G. optiva* was found infected severely by *Nectria coccinea.*

Nectria coccinea (Pers: Fr.) Summa Veg. Scand. ii p. 388. 1849.

Plate: II figs 5-7

(Ascomycotina, Sphaeriales, Nectriacae)

Disease: Nectria canker (Blanchard and Tatter 1981).

Symptoms: Slightly depressed areas of bark around small wounds appear in early stages. In the late stages,

the bark cracks irregularly exposing the underneath stroma of the fungus bearing bright orange flask shaped perithecia singly or in groups.

Morphology of the Fungus: Stromata erumpent, bright orange, well developed composed of textura angularis cells thick walled, perithecia 105-250 x 100-175 µm, ovate to subglobose, bright orangish red at maturity, aggregrated in groups of 5-60, rarely solitary, smooth walled with distnct ostioles, ostioles short, pointed, papillate, darker than the body of the perithecium, perithecial wall 35-60 µm broad, textura angularis Asci 64-95 x 7-12 µm, hyaline, eight spored, spores arranged in uniseriate fashion. Ascospores 12.0-16.0 x 5.0-6.6 µm, hyaline, ellipsoid, bicelled, smooth walled, with a constriction in the centre, paraphyses disintegrate in mature perithecia, thus could not be observed.

Collection Examined: Patiala: Chhatbir forest, Amritbir, 1956 (PUN), On twigs of *G. optiva,* Oct. 9, 1991.

The species has been previously reported from different localities of India by Munjal and kapoor (1962) and Dargan *et al.*(1985). However, the fungus was not earlier known from Punjab on *Grevia optiva* host.

MELIA AZEDARACH Linn. (Vern. Bakain, Drek)

It is a moderate sized deciduous tree with dark grey bark, with long shallow vertical fissures and with white flowers and green rounded fruits. It is cultivated and is also frequently self sown tree in the plains. The timber is not good quality but is still used for furniture and agricultural implements as it is not readily attacked by insects. Leaves are also used for fodder. Leaves and seeds are used medicinally.

The tree was found infected by *Cercospora subsessile* during the present disease survey.

Cercospora subsessilie H & P Sydow Ann. Myc. 11: 329.1913

Plate: II, Figs 8-10.

(Deuteromycotina, Moniliales, Dematiaceae)

Disease: Leaf spot

Symptoms: Circular to irregular well developed necrotic leaf spots on the upper as well as lower surface; spots dull white in the centre surrounded by greenish-yellow to yellowish-brown halo. On the lower side black minute dot like structures prominent in the centre of the spot indicating the acervulii.

Morphology of the fungus: Hyphae hyaline, septate, unbranched, upto 2.3 µm wide, conidiophores olive brown, septate, unbranched, geniculate measuring 30-33.6x1.9-2 µm arising in fasicles. Conidia hyaline, 2-9 septate cylindric, slightly curved to straight, acute at both ends, measuring upto 11.2-54.4x1.2-1.6 µm.

Collection Examined: Patiala: Punjabi university campus, Amritbir 1957 (PUN), On green leaves of *M. azedarach.*

The fungus has been previously reported on Drek by Vasudeva (1961) from Karnal and by Rao (1962) from Hyderabad. It is a new fungal report from Punjab.

SYZYGIUM CUMINI Linn. (Vern. Jamun)

A glabrous evergreen larged sized tree with light coloured thick and rough bark. Leaves broadly oblong or elliptic-oblong. Flowers white or greenish white, fragrant. Commonly planted in Punjab as a roadside tree or along canal banks. Also cultivated for its edible fruits. Its wood is used as a construction timber and for making of boats etc. Fruits are edible and seeds are used as fodder.

The tree was found infected with *Fomes linteus* during the present study.

Fomes linteus (Berk. & Curt.) Cooke. Grevillea 14:20. 1885

Plates: II, Figs. 6-14.

(Basidiomycotina, Aphyllophorales, Polyporaceae)

Disease: White spongy rot.

Symptoms: The wood of the infected stump becomes brittle, degraded and appear white.

Reddish-brown frutifications present prominently in patches at the base of the stump.

Morphology of the Fungus: Sporophores sessile, applanate to imbricate, 1.5-12 x 0.8-4.5 x 1.5 cm, upper surface dull reddish brown, matted, tomentose, zonate, woody, margin thin, light in colour, hymenial surface light brown to rusty brown, soft and velvety to touch, pores round to slightly angular, stratose, 4-5 mm, upto 147 µm wide, pore tubes upto 1.2 cm

long; hyphal system dimitic. Skeletal hyphae yellow to brown, aseptate, unbranched, thick walled upto 3.8 µm wide; generative hyphae light yellow, septate, branched, thin walled 2.5 µm in diameter. Setae dark yellowish brown , thick walled, subulate with acute apices, abundant, usually projecting above the hymenium in the pores 14-31 x 5.8-12 µm, basidia almost hyaline, clavate 15.0-18.0 x 4.0-5.0 µm, basidiospores light yellow, 3.5-4.0 x 3.2-3.5 µm, oval to subglobose in shape.

Collection Examined: Patiala: Chhatbir Park, Amritbir 1958 (PUN), On dead stump of *S. cumini*, Oct. 9, 1991.

Bagchee (1950) reported F. caryophylli on *S. cumini* from India. However, there is no previous report of *F. linteus* on this tree and this is a new host record of the fungus and a new report from Punjab state.

Authors are thankful to the Head, Department of Botany, for providing necessary facilities and to the U.G.C. for providing financial help to carry out this research.

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