
Diverse host records of genus *Ganoderma* from Allahabad

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Periodic survey and collection of Basidiomycetous fungi in Allahabad and its adjoining areas were carried out during the period from 2002 to 2011. In Allahabad the survey sites were area of Allahabad University campus, Company garden, Khusaro Bagh etc. and around Allahabad the survey sites were Naini, Jhunsi, Bamrauli, Nehru Park, Phoolpur, Phaphamau etc. It was observed that *Ganoderma lucidum* was quite predominant fungus among the other members of Basidiomycetes. It is a dangerous pathogen causing white rot in plants. On the other hand it has been used as an herbal remedy for health, recuperation and longevity for centuries in Asian traditional medicine. During the survey it was found that it was growing mainly at the base of some host plants such as *Casuarina equisetifolia*, *Eucalyptus citriodora*, *Grevillea robusta*, *Hamelia patens* etc.

Key words: Allahabad, Basidiomycetes, *Ganoderma*, host

INTRODUCTION

Allahabad being a humid subtropical climate is very rich in natural vegetation which provide perfect substratum for large number of wood decay fungal species. *Ganoderma*, a prominent wood decay shelf fungus belongs to family Ganodermataceae, Order Ganodermatales, sub-class Holobasidiomycetidae and class Basidiomycetes. (Hawksworth *et al.* 1995). It is cosmopolitan and causes white rot of hardwoods by decomposing lignin as well as cellulose and related polysaccharides (Hepting, 1971; Blanchette, 1984; Adaskaveg and Ogawa, 1990; Adaskaveg *et al.* 1993). *G. lucidum* is widely distributed in plains as well as in hills of India. It is a dangerous pathogen causing root rot in tree species (Kumari and Harsh, 2004). Earlier different hosts recorded from India. The present investigation highlights the role of two species of *Ganoderma* viz., *G. applanatum* and *G. lucidum* which are serious pathogen affecting wide range of economically important trees and finally killing them.

MATERIALS AND METHODS

Collection of specimens in Allahabad were area of

Allahabad University campus, Company garden, Medical college, Garden of Botanical survey of India, George Town, Allenganj, Ashok nagar, Khusaro Bagh etc and around Allahabad the survey sites were Bamrauli, Jhunsi, Naini, Nehru Park, Phoolpur, Phaphamau, and a village (Pahari ka Pura) etc.

The materials used during the survey were a pocket lens(10x), scissor, good knife, wood chisel, small paint brush, polythene bags of various sizes, container (small and big boxes), centimeter scale, labels, pencil, camera, preservative (FAA) and notebook to enter the details of the morphological features of the specimens collected. The important criteria considered for morphological study of the specimens during the collection were colour, size, place of growth, texture, smell, manner of growth etc and for anatomical studies sections were cut and were mounted in suitable staining material to study microscopic details of specimens.

Identification of the specimens was made with the help by Fergus (1960); Dickinson and Lucas (1979); Huffman *et al.* (1989); Alexopoulos *et al.* (1996). Identification of host made by Bose and Chaudhury (1991); Misra and Verma (1992); Bose

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et al. (1998).

RESULTS AND DISCUSSION

During survey conducted from year 2002 to 2011, it was found that *G.lucidum* has wide host range than *G.applanatum* (Table 1). *G.applanatum* was found on five host tree species viz., *Delonix regia*, *Ficus racemosa*, *Mimusops elangi*, *Peltephorum pterocarpum* etc. *G.lucidum* was found on twenty

two host tree species (Table 1) viz., *Caesalpinia bonduc*, *Duranta repens*, *Erythrina suberosa*, *Ficus racemosa*, *Ficus religiosa*, *Grevillea robusta*, *Hamelia patens*, *Jacaranda acutifolia*, *Mimusops elengi*, *Mitragyna parvifolia*, *Murraya paniculata*, *Terminalia catappa*, *Caesalpinia pulcherrima*, *Nephelium litchi*, *Tamarindus indica* etc. *G.lucidum* is as hard as *G.applanatum*. It is distinguished by its varnished, red surface (Fig. 1). When it is young it also has white and yellow shades on the var-



Fig. 1 : A-F *Ganoderma applanatum* (A. Mature fruiting bodies attached to the stem of *Peltephorum pterocarpum*, B. Fruiting bodies attached at the base of *Mimusops elangi*, C. Fruiting bodies after spores discharge showing dull appearance at the base of *Ficus racemosa*, D. Mature fruiting body attached to the stem of *Tamarindus indica*, E. Fruiting bodies covered with basidiospores attached on *Delonix regia* F. Basidiospores).

G-S *Ganoderma lucidum* (G. Fruiting body attached on *Hamelia patens*, H. Fruiting body attached on *murraya paniculata*, I. Fruiting body attached on *Duranta repens*, J. Fruiting bodies attached on *Casuarina equisetifolia*, K. Developmental stages of fruiting bodies on *Terminalia catappa*, L. Fruiting bodies on root crown of *Mitragyna parvifolia*, M. Mature fruiting bodies at the base of *Grevillea robusta* N. Fruiting bodies at the base of *Mangifera indica*, O. Fruiting bodies on *Caesalpinia bonduc*, P. Fruiting body on stem of *Delonix regia*, Q. Fruiting body at the base of *Eucalyptus citriodora*, R. Mature fruiting body on *Jacaranda acutifolia*, S. Basidiospores).

Table 1 : Host of Genus *Ganoderma*

Species of <i>Ganoderma</i>	Host Species	Family	Year	Locality
<i>G. applanatum</i>	<i>Delonix regia</i> (Bojer ex Hook.) Raf.	Caesalpinaceae	2005	Naini woodland area
	<i>Ficus racemosa</i> L.	Moraceae	2008	Naini Agriculture Research Institute, Naini
	<i>Mimusops elangi</i> L.	Sapotaceae	2003, 2008	Arts faculty
	<i>Peltephorum pterocarpum</i> (DC.) Backer ex Heyne	Caesalpinaceae	2008	Botanical survey of India, Allenganj
	<i>Tamarindus indica</i> L.	Mimosaceae	2009	Company garden
	On the stump <i>Delonix regia</i> (Bojer ex Hook.) Raf.	-	2003, 2008	Company garden
<i>G. lucidum</i>	<i>Caesalpinia pulcherrima</i> L.	Caesalpinaceae	2006, 2008, 2009	Near Saint Paul Cathedral, Company garden
	<i>Caesalpinia bonduc</i> (L.) Roxb.	Caesalpinaceae	2009	Roxburgh Botanical garden
	<i>Cassia fistula</i> L.	Caesalpinaceae	2009	Medical college campus, Company garden
	<i>Casuarina equisetifolia</i> L.	Casuarinaceae	2006	Roxburgh Botanical garden
	<i>Delonix regia</i> (Bojer ex Hook.) Raf.	Caesalpinaceae	2005	Naini Agricultural Research Institute, Naini.
			2008	Naini ADA Colony
			2009	Company garden
				Medical college
	<i>Duranta repens</i> L.	Verbinaceae	2009	Botanical surgery of India, Allenganj
	<i>Erythrina suberosa</i> Roxb.	Fabaceae	2008	Roxburgh Botanical garden
	<i>Eucalyptus citriodora</i> L.	Myrtaceae	2006, 2009, 2010	Naini Agriculture Research Institute
	<i>Ficus racemosa</i> L.	Moraceae	2008	Arts faculty Allenganj
	<i>Ficus religiosa</i> L.	Moraceae	2003	Roxburgh Botanical garden
<i>Grevillea robusta</i> A.Cunn.ex R. Br	Proteaceae	2009, 2010	Women's hostel	
			Women's hostel	

(Contd. part table 1)

<i>Hamelia patens</i> Jacq.	Rubiaceae	2006	Village (Pahari ka pura)
<i>Jacaranda acutifolia</i> Humb. et Bonpl.	Bignoniaceae	2009, 2010	Company garden
<i>Mangifera indica</i> L.	Anacardiaceae	2002	Company garden
<i>Mimusops elengi</i> L.	Sapotaceae	2004	Roxburgh Botanical garden
<i>Mitragyna parvifolia</i> (Roxb.)Korth.	Rubiaceae	2009	Company garden
<i>Murraya paniculata</i> (Jack.) Linn.	Myrtaceae	2009	Company garden, Medical College
<i>Nephelium litchi</i> Cambess.	Sapindaceae	2005	
<i>Tamarindus indica</i> L.	Mimosaceae	2003, 2008, 2009	Women's Hostel
<i>Terminalia catappa</i> Linn.	Combretaceae	2005, 2006, 2007, 2008, 2009	Medical college Medical college
At the base of stump of <i>Acacia senegal</i>	Mimosaceae	2009	
Log of <i>Delonix regia</i> (Bojer ex Hook.) Raf.	Caesalpiniaceae	2009	

nished surface differing from the dull surface of *G.applanatum*, the artist's conk. The brief description of these two species is as follows:

***Ganoderma applanatum* (Pess. Ex S.F. Gray)Pat.**

Sporophore perennial, shelf like cork, sessile, applanate, single or imbricate, flat, hemispherical in outline, corky soon become hard and woody, heavy 8.0-20cm wide, upper surface bearing a marked pattern of semicircular ridges and projections, dull red brown, crusty, margin in white at first then brown; stipe absent; pore minute, round, regular, 4-5 per mm; basidiospores are cocoa brown in mass, broadly ovoid, bimembranous, outer wall smooth, hyaline, inner wall echinulate (net like pattern), truncate (flattend) at one end, size 6.5-10.5µm x 4.5- 7.5 µm.

***Ganoderma lucidum* (Leyss ex. Fr.) Karst.**

Sporophore annual, single or clustered, stipitate,

sometime sessile, corky becoming woody later, pileus 5-15 cm wide, reddish brown, dimidiate (semicircular in outline) when it is young it has white yellow shades in the varnished surface ; stalk 4-10 cm long, laterally or centrally, varnished and encrusted, pore minute, round, regular, 4-5 per mm; basidiospores are cocoa brown in mass, broadly ovoid, bimembranous, outer wall smooth, hyaline, inner wall echinulate (net like pattern), truncate (flattend) at one end, size 7.5-12.5 µm x 5.5-7 µm.

G.applanatum produces butt-rot in variety of hard wood species and attacks both hard wood and sapwood. *G.lucidum* causes root and butt rot of many living hardwoods or dead stump and tree trunk, attack both sapwood and heart wood. Both the species of *Ganoderma* are affecting ornamental and valuable trees of Allahabad.

Although species of *Ganoderma* are economically important plant pathogen, have medicinal value. For 7,000 year, *G.lucidum* (known as Ling Chih in China and Reishi in Japan), has been used exten-

sively as an herbal remedy to treat a variety of conditions from insomnia and arthritis to hepatitis and cancer.

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