



WOOD ROTTING FUNGI COLLECTED FROM CERTAIN IMPORTANT TREE SPECIES PRESENT IN RAMGARH FOREST, GORAKHPUR (U.P)

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The Gorakhpur region lies in the foothills of Himalayas. It has rich tropical forest due to heavy rainfall and fertile soil. The same climatic condition supports luxuriant growths of fungi also. These conditions have thus been generating a very unique biodiversity including fungal diversity. The trees belong to various families and are of high economic value. Present paper deals with the wood rotting fungi related to the trees only. Their presence affects the ecology and life cycle of the forest and the health and productivity of the trees as well. 43 Plants were taken belonging to 24 families and 20 fungi were reported. Most of these fungi collected belong to the group Ascomycetes and Basidiomycetes

Key words: *Trees, Wood decay, Ecology, Fungi, Management.*

In India a great variety of climatic and altitudinal variations coupled with varied ecological habitats have contributed immensely to the rich vegetation wealth and varied flora and fauna generating, thus a very unique biodiversity.

The forest cover of the country, as per the present assessment is 63.73 million ha. Constituting 19.39% of the geographic area, out of which 37.74 million ha (11.4%) is dense forest, 25.50 million ha (7.76%) open forest and 0.49 million ha (0.15%) mangroves. The total recorded forest area of the country as reported by the state/union Territory Forest Department is 76.52 million ha. The forest cover as per the last assessment of the FSI, 1999, however, was 63.34 million ha. But unfortunately in most of the states, the forest cover is less than the recorded forest area.

National Forest Policy 1988 emphasizes on increasing forest productivity for restoring ecological balance and conservation of country's natural heritage and biodiversity on one hand and to meet the demands for timber, fuel, fiber, paper and pulp and fodder on the other. In achieving this aim, losses due to various a biotic and biotic factors for example diseases must not cross the acceptable limits. The prime objectives of forestry are to protect forest for maximum productive and protective function. Protection of forest from diseases also constitutes one such objective (Verma and

Singh 2003).

The fungi compose about 4% of the total biodiversity on this earth. It is observed that only 5% of total fungi which are estimated about 1.5 million have been isolated. They play a very important role in influencing human life directly and indirectly both. They decay plants and animal bodies and liberate various elements which facilitate the nutrient supply to the plants. These fungi that break down woody plants into their basic elements are a critical part of the tropical ecosystem.

Moreover, on the other hand fungi are also responsible for wood decay. These fungi damage living trees. In the tropics, millions of hectares of plantations are affected, as are fruit trees and woody landscape plants.

Ecology And Life Cycle

In the forests various types of trees are found, in which most of them are woody. Wood comprises heartwood which is made up of dead xylem cells in the center of the tree responsible for structural support and sapwood which are the living xylem cells beneath the bark that help in translocation of water and nutrients to the top of the tree. Heart wood is the most vulnerable part of the wood as it is attacked by various saprobic fungi, whereas pathogenic fungi attack sapwood and can kill the tree. Brown rot fungi have enzymes that break down polysaccharides, but leave most of the brown-coloured lignin.

Wood Decay Species:

S.N	Name of the host	Family	Name of Fungus
1.	<i>Acacia arabica</i>	Mimosaceae	<i>Ganoderma lucidum, Phellinus badius, P. fastusus</i>
2.	<i>Acacia auriculiformis</i>	Mimosaceae	<i>Ganoderma lucidum, Phellinus badius</i>
3	<i>Acacia catechu</i>	Mimosaceae	<i>Ganoderma lucidum, Phellinus sp.</i>
4	<i>Acacia nilotica</i>	Mimosaceae	<i>Aplosporella bakeriana Cylindrosporium acacia Flavodon flavus Ganoderma lucidum , Phellinus badicus</i>
5	<i>Adina cordifolia</i>	Rubiaceae	<i>Flovodon flavus, Stereum complicatum</i>
6	<i>Aegle marmelos</i>	Rutaceae	<i>Poria , Hypoxylon ,Xylaria</i>
7	<i>Albizia lebbek</i>	Mimosaceae	<i>Ganoderma applanatum G.lucidum, Phellinus pinicola</i>
8	<i>Anona squamosa</i>	Anonaceae	<i>Hymenochaete fuliginosa</i>
9	<i>Anogeissus pendula</i>	Combretaceae	<i>Phellinus badicus. Polyporus betulinus, Phellinus sensex</i>
10	<i>Anthocephalus indicus</i>	Rubiaceae	<i>Polyporus gramocephalus Daldinia</i>
11	<i>Averrhoa arambola</i>	Malpigiaceae	<i>Polyporus gramocephalus, P.sulphurens</i>
12	<i>Azadirachta indica</i>	Meliaceae	<i>Armillaria mellea, Xylaria</i>

13	<i>Bauhinia purpurea</i>	Caesalpinaceae	<i>Hypoxylon spiralis</i>
14	<i>Bauhinia variegata</i>	Caesalpinaceae	<i>Polyporus squamosus, P. betulinus</i> <i>Daldinia</i>
15	<i>Bridelia retusa</i>	Euphorbiaceae	<i>Hypoxylon sp., Stereum hirsutum</i> <i>Daldinia</i>
16	<i>Butea monosperma</i>	Fabaceae	<i>Botryodiplodia theobromae</i> <i>Fomes sp.</i>
17	<i>Carissa spinarum</i>	Apocynaceae	<i>Daedalea concentrica</i>
18	<i>Cassia fistula</i>	Caesalpinaceae	<i>Ganoderma lucidum, Hypoxylon</i>
19	<i>Cassia siamiae</i>	Caesalpinaceae	<i>Ganoderma lucidum, Hypoxylon,</i> <i>Stereum hirsutum</i>
20	<i>Cordia latifolia</i>	Boraginaceae	<i>Trametes straminea</i>
21	<i>Dalbergia sissoo</i>	Fabaceae	<i>Ganoderma lucidum, P. fastuosus</i> <i>Hypoxylon</i>
22	<i>Delonix regia</i>	Caesalpinaceae	<i>Ganoderma lucidum</i> <i>Daedalea concentrica</i>
23	<i>Emblica officinalis</i>	Euphorbiaceae	<i>Hypoxylon curies Xylaria</i>
24	<i>Ficus benghalensis</i>	Moraceae	<i>Hypoxylon haematostroma</i>
25	<i>Ficus religiosa</i>	Moraceae	<i>Schizophyllum commune</i>
26	<i>Gardenia latifolia</i>	Rubiaceae	<i>Stereum hirsutum</i>
27	<i>Lagerstroemia parviflora</i>	Lythraceae	<i>Daedalea flavida, Fomes fastuosus</i> <i>Hypoxylon fuscopurpureum</i> <i>H. rubiginosum, H. vogesiacum,</i> <i>Phellinus caryophylli,</i> <i>P. fastuosus, Polyporus gilvus</i>

28	<i>Madhuca indica</i>	Sapotaceae	<i>Hypoxylon caries, Schizophyllum commune</i>
29	<i>Melia azadirach</i>	Meliaceae	<i>Daedalea flavida</i>
30	<i>Manilkara rexandra</i>	Sapotaceae	<i>Hypoxylon sp.</i>
31	<i>Mangifera indica</i>	Anacardiaceae	<i>Pleurotus membranaceus, Schizophyllum commune</i>
32	<i>Morus indica</i>	Moraceae	<i>Schizophyllum commune, Phellinus luctuosus</i>
33	<i>Nyctanthes arboriostis</i>	Oleaceae	<i>Stereum hirsutum Daldinia</i>
34	<i>Pithecellobium dulce</i>	Mimosaceae	<i>Poria sp., Rigidoporus vinctus</i>
35	<i>Santalum album</i>	Santalaceae	<i>Flavodon flavus , Phellinus caryophyllii, Schizophyllum commune</i>
36	<i>Shorea robusta</i>	Dipterocarpaceae	<i>Daedalea flavida D. sprucei Flavodon flavus Fomes ribis, F. roseus Ganoderma applanatum Hypoxylon annulatum, H. diatrypeoides, H. stygium, Lenzitis acut., L. adusta ,L. flaccida, Phellinus badicus, P. caryophyllii. P. fastuosus. P. gilvus. P. pachyphloeus. P. rimosus, P. senex, Polyporus anebus Schizophyllum commune, Stereum hirsutum, Trametes cubensis, T. incerta, T. lactinea, T. spongipellis, T. versicolor</i>
37	<i>Syzygium cumini</i>	Myrtaceae	<i>Hypoxylon caries , Phellinus caryophyllii , P. gilvus</i>

38	<i>Tamarindus indica</i>	Combretaceae	<i>Lenzitis palisoti</i> , <i>Stereum nitidulum</i>
39	<i>Tectona grandis</i>	Verbenaceae	<i>Daedalea flavida</i> , <i>Flavodan flavus</i> , <i>Polyporus adustus</i> , <i>Poria</i> <i>rhizomorpha</i> , <i>Rigidoporus vinctus</i> , <i>Schizophyllum commune</i> , <i>Hypoxylon caries</i> , <i>H. rubiginosum</i>
40	<i>Terminalia arjuna</i>	Combretaceae	<i>Coriolus sp.</i> , <i>Peniophora sp.</i> , <i>Lenzites</i> <i>flaccida</i>
41	<i>Terminalia belarica</i>	Combretaceae	<i>Fomes flavus</i> , <i>Phellinus rimosus</i> , <i>Schizophyllum commune</i> , <i>Trametes</i> <i>stramina</i>
42	<i>Zyzyphus jujube</i>	Rhamnaceae	<i>Pleurotus membranaceus</i>
43	<i>Zyzyphus nummularia</i>	Rhamnaceae	<i>Botryodiplodia theobroma</i>

There are many fungi causing death and decay of wood. The number goes approximately to more than 1,000 fungal species. Most wood decay fungi belong to Basidiomycetes. They are highly modified to get adopted in the forest conditions, for example *Armillaria gallica* is having mycelium extending over 150,000 square meters (370) acres. (Smith *et al* 1992). These fungi form spores from the lower surface of the fruiting body. Some also belong to class Ascomycetes such as *Daldinia*, *Hypoxylon* and *Xylaria*. Here the fungi produce their spores in sacs. The infection spreads either through spore in the air entering through wounds, or by root-to-root contact. When the colonization becomes enough the fungus produces fruiting bodies like conks, brackets and mushrooms that produce more spores. Many wood rot fungi can be identified by their distinctive shape, color and texture of the fruiting bodies. These structures can be found near wounds in bark, at scars in the branches, or around the root crown. Decay fungi are capable of acting upon all the

structural and functional components of trees, so cellulose, hemi cellulose and sometimes lignin also is destroyed. White rot fungi are commonly found in deciduous forests as they are capable of attacking hard wood. They have enzymes which can digest cellulose and lignin both. With the result the wood becomes light coloured, spongy or stringy. Ultimately the wood is white or yellow in colour.

MATERIALS AND METHODS

Presence of a forest right adjacent to the city is a very tempting site for the nature lovers and botanists both. Intensive collection was done in the forest in different seasons in the year 2010-2011. Collections were made of all wood rotting fungi. Specimens were placed in paper bags in the forest usually with a sample of decayed wood and appropriate field notes. Specimens were examined in the laboratory and identified using existing taxonomic treatments. The Angiosperm host plants were also identified (Flora Gorakhpurensis by T.N. Srivastava).

RESULTS AND DISCUSSION

The climatic conditions play an important role in supporting large number of fungi in tropical forests. Mostly these fungi belong to Basidiomycetes; some of them are Ascomycetous as well. Fungal diseases are the most destructive agents affecting the planting stock in forest nurseries. With the result plantation yield is also affected directly reducing the forest productivity. Nair *et al.* (1996) have dealt with the impact of diseases in tropical forests of India. As mostly the fungal spores enter the trees through wounds, there are certain measures which can be taken care of for avoiding damage to tree barks in big trees in plantations and landscapes. Wounds caused by saws, knives, machinery, or fire, create pathways for fungi to enter wood. Diseased or damaged branches should be cut cleanly. While pruning it should be taken care of that branches are small to avoid larger wounds. Dead trees, branches, and their fruiting bodies should be destroyed to check further spread of infection. Moreover, Gorakhpur region falling in Himalayan Tarai is somewhat neglected, as fungi occurring on different trees in the forest is not properly documented till date. Keeping in view the present work will help in listing of tree fungi. Some proper biotechnological application packages may also be developed to increase forest productivity. This will only be possible when there is sufficient material on listing and documentation of fungal diversity and diseases of important forest trees.

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