Morphological Study Of Some Common Wood Rotting Fungi From Northen Part Of Fiji Island

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Abstract: The wood rotting fungi might have played an important role in sustaining the forest ecosystem since fungi are major decomposers where they break down organic matter which would otherwise not be recycled. Elements such as nitrogen and phosphorus are required in large quantities by biological systems which are not in abundant in the environment. The action from the fungi's allows the release of these elements from decaying woods and logs to be available to other living organism and having a balanced ecosystem in the forest. In the present investigation a survey was made in which eighteen samples of wood rotting fungi were collected from Bulileka and Valebasoga, Vanua Levu, Fiji Island. Morphological study of the collected fungi was carried out with the respect to common name, scientific name, locality, season, edibility and morphology of fruiting body.

Key words: wood rotting fungi, ecosystem and morphological study.

1 INTRODUCTION

Fiji's forests can be divided into 4 main ecological categories. These are Preserved Forests, Protected Forests, Multiple Use Forests, and Plantation Forests. The Preserved forests are areas of natural forests to be maintained in an undisturbed natural condition for the preservation of certain biological values. Preserved forests include nature reserves and national Parks. Protected forests are areas of highly sensitive native forests by virtue of their topography, climate, soil type or a combination of the two factors. Timber harvesting and other forestry operations are restricted to minor forest products. Multiple use forests are forest areas carrying indigenous forest vegetation to be maintained under forest cover and to be used mainly for the production of timber, minor forest products, protection of water catchments, wild life habitat, forest recreation and amenity values while the plantation forest are planted forests, mainly of *Pinus caribaea* and *Sweitenia macrophylla.* Wood is a truly remarkable, naturally renewable resource therefore its production in both the main land's play an imperative part in Fiji economy. In terms of properties physical and chemical, wood is an exceptionally hard substrate to degrade. One of the principal behind is that wood contains less levels of nitrogen, which is required to produce the enzymes that degrade the main structural component of wood - cellulose (about 40-50% of the dry weight of wood), hemicelluloses (25-40%) and lignin (20-35%). The lignin present becomes a barrier to wood decay because lignin is a complex aromatic polymer that encrusts the cell walls, preventing access of enzymes to the more easily degradable cellulose and hemicelluloses. Despite this formidable listing of obstacles, wood, logs and timbers are degradable by fungi, and these are wood rotting fungi. These fungi are of three different types according to it attack on the woods – soft rot fungi, brown rot fungi and white rot fungi. Wood rotting fungi are an important component of forest ecosystem (Wang *et al*, 2011). In the forest wood rotting fungi helps decay, recycle carbon, nitrogen and convert plant debris into humus. Large molecules are broken down by the fungus through the release of enzymes and the nutrients are absorbed by hyphae. According to (Eriksson et al., 1990) brown rot fungi which produce bracket shaped fruit bodies attacks and rapidly depolymerize structural carbohydrates in the cell wall leaving the modified lignin behind. The fungus, mostly basidiomycetes are the most efficient lignin degraders in nature. Some fungi grow on trees in a stack, called shelf fungi which attacks and digest the trucks and the branches of the trees. White rot fungi most remarkable feature is their ability to completely degrade lignin and it also emerged as a promising groups for biotechnology application, especially in bioremediation (Reddy *et al*., 2011). All in all wood rotting fungi is a disease of old, dead woods which destroys the trees internal and external structural components which are cellulose, hemicellulose and lignin. The fungi makes tree hazardous, because trucks and limbs become unable to support their own weight and fall, especially when stressed by heavy rain, wind and other conditions which make thing worse. Therefore it is important to know what different types of wood rotting fungi are present in the environment such as Fiji so in the present study twenty-two samples of wood rotting fungi from different sites were collected and its morphological (external) characteristics were studied.

2.0 MATERIALS AND METHODS

2.1 COLLECTION OF WOOD ROTTING FUNGI

Eighteen wood rotting fungi were collected from different sites of Bulileka and Valebasoga of Vanua Levu, Fiji Island. Samples were collected from damp places, dead wood logs and trees. This was done during all season but the collections were in abundances after a rainy season. All the wood rotting fungi were photographed at the sight using camera after which the samples were collected and marked with information such as collection numbers with names, locations and date of collection.

Table 1: *Localities from where collections were made*

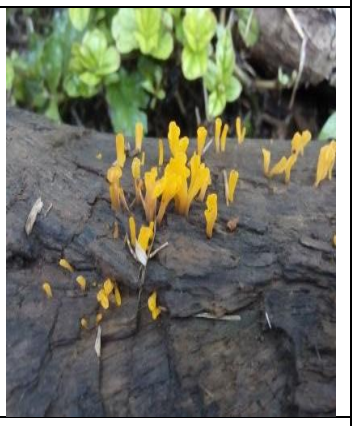
Province	District	Location	Forests type
Macuata	Labasa	Bulileka	Mixed forests
		Valebasoga	Mixed forests

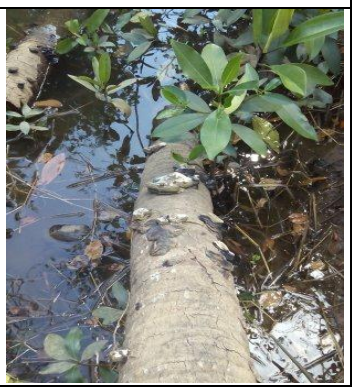
3.0 Results

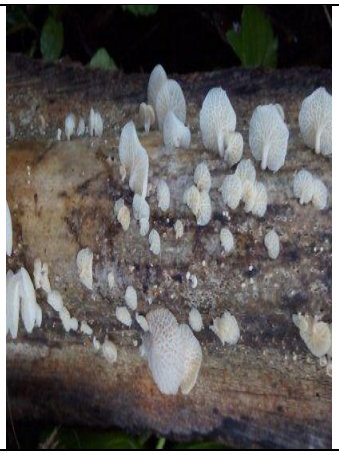
In the present study eighteen specimens were collected from various areas of Bulileka and Valebasoga of Vanua Levu, Fiji Island. The samples were critically examined with the respect to its morphological characteristics which is summarized and presented in the table 2.

Table 2: *Morphological study of wood rotting fungi*

Common name(s)	Scientific name	Family Name	Locality	Season	Edibility	Morphology of the fruiting body	Picture
Split Gill	*Schizophyllm commune* Fr.	Schizophyllaceae	Bulileka	Rainy period	Inedible (Dingley et al., 1981)	Saprobic on dead wood (hardwood and softwood) or parasitic on living wood; growing alone or more frequently and gregariously to clustered. Fruiting Body is 1-5 cm wide fan-shaped when attached to the side of the log and whitish to grayish, is without a stem and the flesh is tough, leathery and pallid. (Dingley et al., 1981)	
False parasol or green-spored parasol	*Chlorophyllm molybdites* (G. Mey.) Massee	Agaricaceae	Bulileka	Rainy period	Inedible (Dingley et al., 1981)	White throughout, Stem is 5-25 cm long 1.5-2.5 cm. thick more or less equal, sometimes slightly enlarged toward base, Gills is Free from the stem and the Cap: 10-30 (40) cm; convex to conical becoming convex to broadly convex or nearly flat in age (Dingley et al., 1981).	
Artist's bracket, Flacher lackporlig	Ganoderma applanatum (Pers.) Pat.	Ganodermataceae	Bulileka	Rainy period	Inedible (Dingley et al., 1981)	Saprobic and parasitic which grows alone or in groups on decaying logs and stumps, or producing a white to straw-colored rot of sapwood and heartwood and sessile, 6-60 cm broad, 5-10 cm thick fan-shaped, semicircular, or irregular. (Dingley et al., 1981)	

Honey fungus	Armillariella mellea (Vahl) P. Karst.	Physalacriaceae	Bulileka	Rainy period	Edible (Dingley et al., 1981)	Whitish to watery tan, Stem is 5-20 cm long 5-3.5 cm thick tapering to base due to clustered growth pattern, the Gills are Attached and Cap is 3-15 cm, convex to broadly convex or flat in age. (Dingley et al., 1981)	
Jelly fungi	*Dacryopinax spathularia* (Schwein.) G.W. Martin	Dacrymycetes	Bulileka	Rainy period	Edible (Dingley et al., 1981)	Gelatinous fruit bodies are yellow to orange, have rounded stalks at the base, are flattened upward, and have an overall fan-shaped to spatula-shaped. Fruit bodies 0.5 to 2.5 cm tall and 0.5–3 mm wide. (Dingley et al., 1981)	
Pleated ink cap	*Coprinus plicatilis* (Curtis) Fr.	Psathyrellaceae	Bulileka	Rainy period	Inedible (Dingley et al., 1981)	The cap of *C. plicatilis* has a diameter of 1 to 2 cm and heavily ribbed and initially egg – shaped, then convex and finally flat. Gills are white which turns grey and then to black. The stem is 6 cm long but only 4 or 5 mm in diameter with a slightly swollen base. (Dingley et al., 1981)	
Bracket fungi	*Elfvingia applanata* (Pers.) P. Karst.	Ganodermataceae	Bulileka	Rainy period	Inedible (Dingley et al., 1981)	Saprobic , which grows on decaying logs dead roots and stumps hence producing a white colored rot of sapwood and heartwood and the Cap is 5 to 20 cm fan-shaped, this can be semicircular and irregular in shape. (Dingley et al., 1981)	

No common name	*Polystictus sanguineus* (L.) G. Mey.	Hymenochaetaceae	Bulileka	Rainy period	Inedible (Dingley et al., 1981)	Grows on dead hardwoods. It grows in the form of a thin dry conk with a lateral attachment to its substrate, is bright orange on all surfaces with concentric zonation, and the pores on the underside are minute. (Dingley et al., 1981)	
Stag's horn fungus	*Xylaria hypoxylon* (L.) Grev.	Xylariaceae	Bulileka	Rainy Period	Inedible	The fruit bodies, characterized by erect, elongated black branches with whitened tips, typically grow in clusters on decaying hardwood. The branch is like a antlers with a small stroma of 2 to 8mm in diameter at the base and 3 to 5cm tall.	
No common name	*Earliella scabrosa* (Pers.) Gilb. & Ryvarden	Polyporaceae	Vale-basoaga	Rainy Period	Inedible (Dingley et al., 1981)	The fruiting body grows 3-10 cm wide, 3-7 cm radius, 1-2 mm thick; stems 5-20 mm long, 3-5 mm diameter, chestnut to black, with a cortex and often tomentose when sometimes grey. (Dingley et al., 1981)	
Southern Bracket fungi	*Ganoderma australe* (Fr.) Pat.	Ganodermataceae	Vale-basoaga	Rainy Period	Inedible (Dingley et al., 1981)	large bracket fungus that grows to 25cm across but exceptionally 50cm, and 5 to 25cm thick, with a pale margin and lower surface and a dark brown or dark grey upper surface. The tube layer is brilliant white when ready to release spores. (Dingley et al., 1981)	

Wood ear fungi	*Auricularia cornea* Ehrenb	Auriculariaceae	Vale-basoaga	Rainy Period	Edible (Dingley et al., 1981)	This persistent fungus has a soft pliable gelatinous body, densely covered with short hairs on outside, inside brown with whitish-grey bloom. Ear-like about 10 cm long, body appears pinched into the short stalk. Densely covered with hyaline hairs which grows in gregarious or in caespitose groups. (Dingley et al., 1981)	
Jelly fungus	*Auricularia delicate* (Mont.) Henn.	Auriculariaceae	Vale-basoaga	Rainy Period	Edible (Mata Hidalgo 2003)	The fruit body is soft gelatinous and transluscent, sessile to substipitate, semicircular up to 80 mm diameter by 1-2 mm thick. The pileus minutely tomentose to almost glabrous with fine hyaline cream colour and hymenium surface and growing in gregarious or in groups. (Mata Hidalgo 2003)	
Reishi mushrom	*Ganoderma lucidum* (Curtis) P. Karst.	Ganodermataceae	Vale-basoaga	Rainy Period	Edible (Dingley et al., 1981)	The fruiting body is soft (when fresh), corky, and flat, with a conspicuous red-varnished, kidney-shaped cap and, depending on specimen age, white to dull brown pores underneath. It lacks gills on its underside and releases its spores through fine pores. (Dingley et al., 1981)	

No common name	*Lentinus subnudus* Berk.	Polyporaceae	Vale-basoaga	Rainy Period	Edible (Dingley et al., 1981)	Pileus 2 inches or more broad, shape is subinfundibuliform and the Gills are distant, decurrent, slightly forked behind, nearly entire, scarcely at all echinulate. The stem slender, rigid, black at the base, 1 inch or higher. (Dingley et al., 1981)	
No common name	*Microporus flabelliformis* (Klotzsch) Pat.	Polyporaceae	Vale-basoaga	Rainy Period	(Dingley et al., 1981)	Pilei flabelliform, or sometimes conchate, 3-10 cm wide, 3-7 cm radius, 1-2 mm thick; stems 5-20 mm long, 3-5 mm diameter, chestnut to black, with a cortex and often tomentose when sometimes grey. (Dingley et al., 1981)	
No common name	*Cymatoderma caperatum* (Berk. & Mont.) D.A. Reid	Meruliaceae	Vale-basoaga	Rainy Period	(Dingley et al., 1981)	The basidioma is a infundibuliform type similar to a funnel, centrally stipitate, hymenophore with a radial which has wrinkles, dendriform, gloeocystidia is abundantly present,basidiospores is more subcylindrical to ellipsoid, smooth and thin – walled, 7 – 10 x 3 cm in size. (Dingley et al., 1981)	
White-rot fungus	*Trametes elegans* (Spreng.) Fr.	Polyporaceae	Vale-basoaga	Rainy period	Inedible (Dingley et al., 1981)	The fruiting body is Whitish, tough and corky. Saprobic nature which grows on the deadwood and softwoods. Cap is up to 35 cm across and 3 cm in thick, semicircular and irregularly bracket-shaped. The Stem is Usually absent. (Dingley et al., 1981)	

There are several scientists who have studied on wood rotting fungi diversity since it plays an important role in the forest ecosystem and old disease of woods. Hadawoo (2010) reported some edible mushrooms from genera like *Agaricus, Coprinus, Cyathus, Lycoperdon, Schizophyllum, Daldinia, Polyporus* and *Ganoderma* which are also found during this study. Saksena, S.B. & K.M. Vyas (1964) reported on the wood-decaying fungi of Sagar, Madhya Bharat. White rot fungi have been widely studied for their ability to degrade variety of environmental soil pollutants (Akhtar *et al.,* 1992; Turner *et al.,* 1992). Wood rotting fungi in eastern china – five polypore diversity in Jiangnx provine was studied (Bing wang *et al*., 2011). Rajendra *et al*., (2014) Diversity of wood decay fungi at Mantha, Jalna (MS) India. The result of this study will be handful for the proof that the studied wood rotting fungi are having the ability to degrade or decay wood, logs and timbers causing brown or white rots hence it means that these fungi has imperative role in forest to maintain a balanced ecosystem in terms of decomposition. The survey made also enables that there are many wood rotting fungi from the areas of Bulileka and Valebasoga which have high potential for lignin decomposition and keeping a balanced environment.

4.0 References

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