

# Habitat Distribution of Fungal Species Collected at Lung NGOC Hoangnature Reserve

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## ABSTRACT

Through the survey of 4 different habitats in Lung Ngoc Hoang Nature reserve in Vietnam, totally 63 macro fungi have been found with 313 individuals. On forest habitat, 49 species with 116 individuals were obtained. In which, *Pycnoporus sanguineus* and *Chaetocalathus columellifer* had the highest number of individuals with 9 individuals, accounting for 7.76% of the total number of individuals collected in the forest. On the riverside habitat, 47 species with 89 individuals were obtained; The roadside habitat found 71 individuals with 42 species, in these two habitats *Pycnoporus sanguineus* was the most dominant species. On the agricultural habitat, there are 24 species with 37 individuals out of the total number of individuals collected. In this habitat, species *Coprinus disseminates*, *Chaetocalathus columellifer* and *Lenzites palisoti* were the most dominant with 3 individuals found, accounting for 8.11% of the total population here.

**Key words :** Lung Ngoc Hoang, Macro fungi, Habitat, Biodiversity

## Introduction

Lung Ngoc Hoang Wetland Nature Reserve (LNH) was established on the basis of land of Phuong Ninh Forestry School, the end of the famous natural ecological system in Phung Hiep district. It covers the southwest of Can Tho province. The conservation area is located at the contiguous position between the two ecological areas of West Song Hau and Ca Mau peninsula, this area is formed from the process of sea construction and alluvial deposition, mainly sea and swamp; forming a low and fairly flat terrain, with the average elevation variation from 0.3 to 1.5m and divided by a system of canals (Statistical Yearbook, 2013). This place is a large floodplain with ornamental creatures with many actual species (about 206 animal species, 330 plant species belonging to 224 genera, 92 typical species are forest ornamentalspecies, tree species, etc. Due to low impact of human factors, Lung Ngoc Hoang wetland

nature reserve has become a biodiversity reserve. It is a suitable environment for large fungi to grow more and more diversely. Therefore, it is considered necessary to study the distribution of large mushroom species by habitat here to add more data on the diversity of fungal species at LNH.

## Materials and Methods

Based on the topographic map of the area, 30 general survey points will be investigated, through 4 main habitats that need to be monitored, assessed and sampled: agricultural land (Rice, Sugarcane), forest land, riverside and roadside. At each of the main survey points, samples were collected by line. Collect all macro fungi that appear on the survey area.

*Forest habitat:* humidity here is high; there are many shades, and many plant residues, creating a rich organic environment. Macro fungi have the

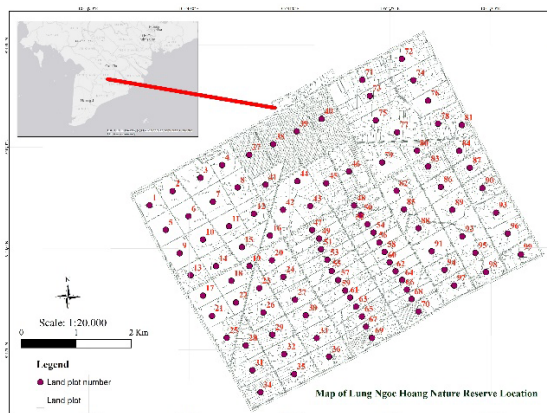


Fig. 1. Location map of survey sites at Lung Ngoc Hoang Nature Reserve.

ability to decompose organic matter, so fungi can thrive here by using plant residue as a source of nutrients for it.

**Agricultural habitat:** the conditions here are harsher, with no shade, dry, hard soil and high temperatures. Most of the plants here are herbaceous (herbs), there is no substrate for macro fungi to grow, so very few species of fungi can grow here (there are still viable species, but a small number). **Roadside habitat:** The terrain is less flooded, the trees are diverse, in addition, the

land surface cover of roadside plants is very large. Macro fungi are usually found under living trees (parasites) or on rotting wood, on soil, on plant residues (saprophytes).

**Riverside habitat:** humidity is also high here. Waterlogged conditions (water up) affect the growth of fungi so they do not grow as much as elsewhere.

## Results and Discussion

The information showing the distribution of fungal species by habitat is presented in Table 1. The total number of species found is 63 species, distributed in 4 different habitat types.

The distribution of the number of individuals and species of large fungi by habitat in the LNH Wetland Nature Reserve is shown in Figure 2.

### Forest habitat

49 species with 116 individuals were obtained. In which, species *Pycnoporus sanguineus* and *Chaetocalathus columellifer* had the highest number of individuals with 9 individuals, accounting for 7.76% of the total number of individuals obtained in this

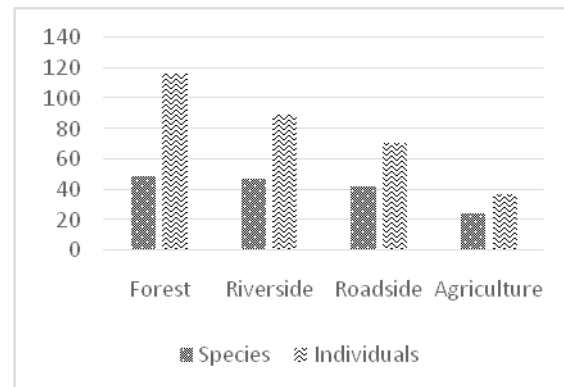


Fig. 2. Distribution of species and numbers of macro fungi by habitat in LNH Nature Reserve.

habitat. Species *Amanita virgineoides*, *Astraeus Hygrometricus*, *Auricularia tenuis*, *Auricularia fuscosuccinea*, *Coprinus disseminates*, *Crucibulum laeve*, *Daldinia C-oncentrica*, *Ganoderma Sp1*, *Ganoderma Subresinosum*, *Geastrum fimbriatum*, *Gymnopilus penetrans*, *Hexagonia apiinitus*, *Macroripitus apiiniaria*, *Parasola auricoma*, *Scleroderma nitidum* had the lowest number of individuals with 1 individual accounting for 0.86% of the total number of individuals obtained on this habitat, the remaining species were found from 2 to 8 individuals. According to the assessment of Waring, R. H., & Schlesinger, W. H. (1985), the forest habitat here has high humidity, lots of shade and lots of vegetation, creating an abundant organic environment, besides, this habitat also has conditions near water that are very suitable for many types of fungi to grow. Therefore, in the survey area on this habitat, the number of species found is quite rich.

### Riverside habitat

47 species with 89 individuals were obtained, in which *Pycnoporus sanguineus* species predominated with 7 individuals found accounting for 7.86% of the total number of individuals found in this habitat; *Chaetocalathus columellifer* and *Pycnoporus cinnabarinus* followed with 5 individuals found, accounting for 5.62%. Species *Amauroderma rugosum*, *Astraeus Hygrometricus*, *Auricularia fuscosuccinea*, *Cortinarius violaceus*, *Crucibulum laeve*, *Cyathus striatus*, *Dictyophora multicolor*, *Grifola frondosa*, *Guepiniopsis spathularia*, *Hexagonia apiaria*, *Lactarius*,

**Table 1.** Habitat distribution of fungal species collected at Lung Ngoc Hoang

No.	Species	Genus	Habitats			
			Forest	Agricultural	Roadside	Riverside
1	<i>Amanita virgineoides</i>	Amanita	X			
2	<i>Amauroderma rugosum</i>	Amauroderma	X	X	X	X
3	<i>Astraeus Hygrometricus</i>	Astraeus	X	X		
4	<i>Auricularia tenuis</i>	Auricularia	X		X	
5	<i>Auricularia fuscusuccinea</i>		X	X	X	
6	<i>Auricularia Polytricha</i>		X	X	X	
7	<i>Coprinus disseminates</i>	Coprinus	X	X	X	X
8	<i>Cortinarius violaceus</i>	Cortinarius		X	X	
9	<i>Crucibulum laeve</i>	Crucibulum	X	X		
10	<i>Cyathus striatus</i>	Cyathus		X	X	
11	<i>Chaetocalathus columellifer</i>	Chaetocalathus	X	X	X	X
12	<i>Daldinia Concentrica</i>	Daldinia	X			
13	<i>Dictyophora indusiata</i>	Dictyophora				X
14	<i>Dictyophora multicolor</i>			X		
15	<i>Entoloma sinuatum</i>	Entoloma			X	
16	<i>Favolus brasiliensis</i>	Favolus				X
17	<i>Filoboletus manipularis</i>	Filoboletus			X	
18	<i>Ganoderma fulvellum</i>	Ganoderma	X	X	X	X
19	<i>Ganoderma lucidum</i>		X	X	X	
20	<i>Ganoderma multipileum</i>		X	X		
21	<i>Ganoderma Sp1</i>		X			
22	<i>Ganoderma Sp2</i>				X	
23	<i>Ganoderma Subresinosum</i>		X	X	X	
24	<i>Geastrum fimbriatum</i>	Geastrum	X			
25	<i>Grifola frondosa</i>	Grifola		X		
26	<i>Guepiniopsis spathularia</i>	Guepiniopsis	X	X	X	X
27	<i>Gymnopilus penetrans</i>	Gymnopilus	X	X	X	X
28	<i>Herbsttrompete Craterellus cornucopioides</i>	Herbsttrompete	X			
29	<i>Hexagonia apiaria P. Beauv.</i>	Hexagonia	X	X		X
30	<i>Hypholoma fasciculare</i>	Hypholoma	X	X	X	
31	<i>Inocybe rimosa</i>	Inocybe	X			X
32	<i>Lactarius salmonicolor</i>	Lactarius		X		
33	<i>Lentinus Crinitus</i>	Lentinus	X			
34	<i>Lenzites palisoti</i>	Lenzites	X	X	X	X
35	<i>Leucocoprinus birnbaumii</i>	Leucocoprinus			X	X
36	<i>Lycoperdon pyriforme</i>	Lycoperdon	X	X	X	X
37	<i>Macrolepiota Procera</i>	Macrolepiota	X			
38	<i>Marasmius haematocephalus</i>	Marasmius	X	X	X	X
39	<i>Marasmius oreades</i>		X			X
40	<i>Marasmius pulcherripes</i>		X			
41	<i>Marasmius rotula</i>		X	X	X	
42	<i>Microporus flabelliformis</i>	Microporus	X	X	X	
43	<i>Microporus xanthopus</i>		X	X		
44	<i>Mycena chlorophos</i>	Mycena	X	X	X	
45	<i>Mycena galericulata</i>		X	X	X	
46	<i>Parasola auricoma</i>	Parasola	X			
47	<i>Parasola conopilus</i>		X	X	X	X
48	<i>Parasola plicatilis</i>		X	X	X	
49	<i>Pluteus petasatus</i>	Pluteus			X	
50	<i>Psathyrella gricilis</i>	Psathyrella	X			

**Table 1.** Habitat distribution of fungal species collected at Lung Ngoc Hoang

No.	Species	Genus	Habitats			
			Forest	Agricultural	Roadside	Riverside
51	<i>Pycnoporus sanguineus</i>	Pycnoporus	X	X	X	X
52	<i>Pynoporus cinnabarinus</i>		X	X	X	X
53	<i>Phallus aurantiacus</i>	Phallus		X		
54	<i>Scleroderma citrinum</i> Pers.	Scleroderma		X	X	
55	<i>Scleroderma nitidum</i> Pers.		X		X	X
56	<i>Scutellinia scutellata</i>	Scutellinia		X	X	
57	<i>Schizophyllum commune</i>	Schizophyllum	X	X	X	X
58	<i>Tyromyces chioneus</i>	Tyromyces			X	
59	<i>Thelephora griseozonata</i> Cooke	Thelephora	X	X	X	X
60	<i>Trametes seabrosa</i>	Trametes		X		
61	<i>Trametes cervina</i>		X	X	X	
62	<i>Trametes hirsuta</i>		X	X	X	
63	<i>Volvariella volvacea</i>	Volvariella				X

*xaranticolor stri-atus*, *Paracutia stellus striatus*, *Paracutia constitupus* *Trametes cervina*, *Trametes hirsuta* only appeared with 1 individual, accounting for 1.12% of the total number of individuals collected. Another assessment by Thornton, R. D. (1991) and Connop *et al.* (2011), Riverine habitats with many canopy trees along with high humidity are quite good conditions for fungal growth, however, conditions of waterlogging (water up) have affected the growth of the fungi, so the fungus did not grow as much as in the forest habitat.

#### Roadside habitat

out of a total of 313 individuals collected, in this habitat, 71 individuals classified 42 species were found. In which, *Pycnoporus sanguineus* is still the most dominant species with 6 individuals found, accounting for 8.45%. Next, the species *Pynoporus cinnabarinus* with 5 individuals accounts for 7.04%. Besides, there are 24 species with only one individual, accounting for 1.41%, such as: *Trametes cervina*, *Tyromyces chioneus*, *Scleroderma citrinum*, *Parasola plicatilis*, *Microporus flabelliformis*... According to Keizer, P. J. (1993), the terrain along the roadside is less flooded, the trees are diverse, in addition, the land surface coverage of roadside plants is very large. Macro fungi are usually found under living trees (parasites) or on rotting wood, on soil, on plant residues (saprophytes).

#### Agricultural Habitat

Only 24 species with 37 individuals were encountered. *Coprinus disseminates*, *Chaetocalathus columellifer* and *Lenzites palisoti* were dominant with

3 individuals found accounting for 8.11% of the total population here. In addition, the species *Amauroderma rugosum*, *Dictyophora indusiata*, *Favolus brasiliensis*, *Ganoderma fulvellum*, *Guepiniopsis spathularia*, *Gymnopilus penetrans*, *Inocybe rimosa*, *Leucocoprinus birnbaumii*, *Marasmius oreades*, *Para-sola conopilus* spp. is the lowest with 1 individual accounting for 2.71%. According to Ali-Shtayeh *et al.* (2003), on the agricultural land habitat, the conditions are harsher, the soil is dry, and the temperature is high. Most of the plants here are herbaceous with no substrate for fungi to grow. In addition, in this habitat, there has been an impact from human hands that makes the soil surface often change along with the appearance of pesticides that destroy the habitat of fungi, and make the soil surface worse. Soil is degraded so in this habitat, the number of fungi species obtained is only about 30 species, which is quite suitable.

Macro fungi species collected at Lung Ngoc Hoang (Table 1) are distributed quite diversely, they are concentrated in favorable conditions, some species appear in all four surveyed habitats such as *Pycnoporus sanguineus*, *Pynoporus cinnabarinus*, *Guepiniopsis spathularia*, *Chaetocalathus columellifer*, *Ganoderma fulvellum*. Besides, some species appeared in only 1 of the 4 surveyed habitats such as *Amanita virgine-oides*, *Psathyrella gricilis*, *Parasola auricoma*, *Marasmius oreades*, *Scleroderma nitidum*, *Daldinia salmonicolor* and *Lactarius salmonihocolor*, *Lactarius salmonitho*, ...According to XIAO-LAN, M. A. O. (1988), Kujawa, A. (2009), the fungi *Pycnoporus sanguineus*, *Pynoporus cinnabarinus*, *Guepiniopsis spathularia*, *Chaetocalathus columellifer*, *Ganoderma*

*fulvellum* have quite diverse living conditions, distributed in areas with humidity about 70-80%, mainly on dead tree trunks or humus, and close to water sources. These conditions were present in most of the four habitats surveyed at LNH, so the above groups of fungi were found in both habitats. The same study also suggested that *Lactarius salmonicolor* and *Microporus xanthopus*... only live in the conditions of leaf humus and shade, near water sources, so most of these species only appear in the habitat of Melaleuca forest. Other species such as *Marasmius oreades*, *Scleroderma nitidum*... are only adapted to open places, relatively high terrain, on grass beds, grasslands, and even sand dunes, so when surveyed this group only appeared on shallow land habitats.

### Regarding the frequency of occurrence

The large fungal species in the Lung Ngoc Hoang Wetland Nature Reserve are divided into 3 different groups: 1) The common occurrence group with 2 species *Pycnoporus sanguineus* and *Chaetocalathus columellifer* with the frequency of occurrence is respectively: 43.33-50% accounted for 2.5% of total species collected. 2) The group appeared on average with 10 species (*Amauroderma rugosum*, *Auricularia Polytricha*, *Coprinus disseminates*, *Ganoderma fulvellum*, *Ganoderma lucidum*, *Lenzites palisoti*, *Lycoperdon pyriforme*, *Marasmius rotula*, *Mycena galericulata*, *Pycnoporus cinnabarinus* accounted for 23.33-40%) with a frequency of 23.33-40%. 3) The remaining 12.5% is a rare group with 68 species accounting for 85% of the total number of species obtained.

### Conclusion

Through survey on forest habitat, 49 species with 116 individuals were obtained. On the riverside soil habitat, 47 species with 89 individuals were obtained; The roadside habitat found 71 individuals with 42 species, in these two habitats, *Pycnoporus sanguineus* was the most dominant species. On the agricultural habitat, there are 24 species with 37 individuals out of the total number of individuals collected. In this habitat, species *Coprinus disseminates*, *Chaetocalathus columellifer* and *Lenzites palisoti* dominated with 3 individuals found, accounting for 8.11% of the total population here.

It is recommended to conduct studies to identify unidentified species and add other species to the list of macro fungi species in Vietnam

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