



REPUBLIC OF BENIN

UNIVERSITY OF PARAKOU

LABORATORY OF APPLIED ECOLOGY



**RUFFORD SMALL GRANTS FOR NATURE CONSERVATION
APPLICATION**

Midterm-Report of the Rufford 2nd Grant N°27719-2

Conservation of mushrooms through the establishment
of edible mushroom value chain and the optimization of
sensitizations

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October 2019

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Introduction

Several mycological investigations have established the important role that wild edible fungi play in lives of rural populations in tropical Africa (Boni and Yorou 2015; Kamou *et al.* 2015; Koné *et al.* 2013; Yorou *et al.* 2014). Indeed, wild edible fungi are used for food, medicinal care and are source of important income for rural populations. In West African region, a repertory of about sixty (60) edible species has been established (Yorou *et al.* 2014), of which 35 are actually cited by the populations on the basis of ethno-mycological surveys in Benin (Codjia 2013; Codjia and Yorou 2014; Boni and Yorou 2015). These mushrooms, mostly forest-dwelling, are today in a critical situation because of the progressive degradation of their habitat (Yorou and De kesel 2011) implying the need of conservation to ensure their availability for rural population who dependents on them. To tackle this issue, a revitalization of the exploitation of wild edible fungi and an organization of the sector through the establishment of a value chain is appropriate. Indeed, according to Yorou *et al.* (2002, 2014), Benin's woodland could produce a biomass of 300 kg of wild edible fungi per hectare. For example, harvesting wild edible fungi would be economically more profitable compared to lumbering over a 20-year (Yorou *et al.* 2002).

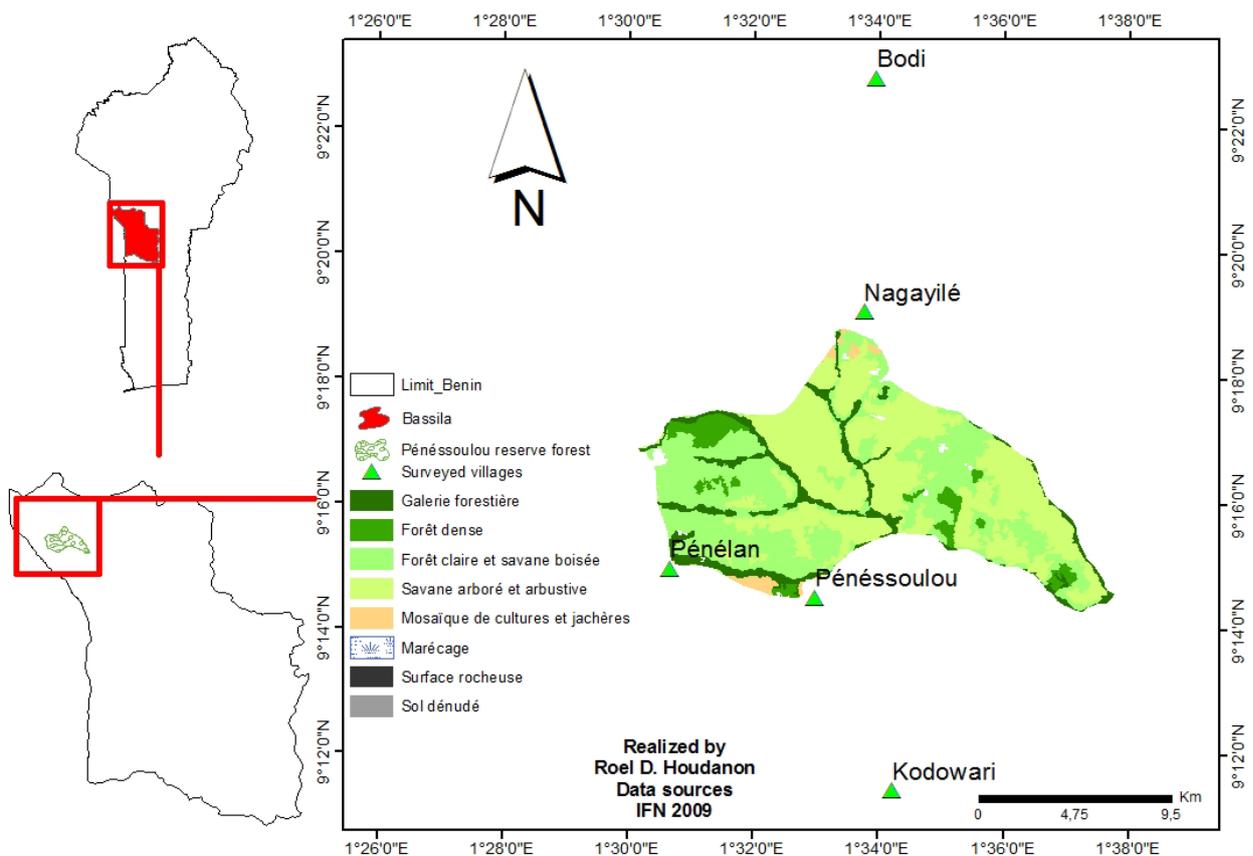
Given the variability of ethno-mycological knowledge among socio-ethnic groups (Boni and Yorou 2015), the list of wild edible fungi in Benin is far from being exhaustive, since there are regions of Benin that are still not investigated and others are just partially investigated, as it is the case in the Bassila's region. This region with very important forest resources at national level experienced a first phase of important mycological investigation in 2017 with the financial support of the Rufford small grant. The present work is therefore a continuation of investigations in the remaining part of the Bassila region.

1 Methodology

1.1 Study area

The present work was carried out in the Pénéssoulou reserve forest (Bassila commune) located between longitudes 9 ° 13'-9 ° 18 'and latitudes 1 ° 30 E-1 ° 30' E in northwestern Benin. It covers an area of 5470ha and is located in Sudano-Guinean region with an annual rainfall of 1200 mm (Djogbénou *et al.* 2008). The vegetation of

this forest presents four physiognomic types namely: gallery forests, dry dense forests, woodlands and savannas. The region has natural forest with mixed vegetation and composed of ectomycorrhizian tree species such as *Isoberlinia doka*, *Uapaca somon* and *Azelia africana*. The main activities of populations living around the forest are agriculture, fisheries and logging. The Pénésoulou reserve forest has also important mycofloristic potential composed of very useful plant to local populations (PRRF 2000).



1.2 Data collection

The study was carried out in five villages of the district of Pénésoulou in the municipality of Bassila. These villages are Kodowari, Pénésoulou, Pénélan, Nagayilé and Bodi. Surveys were conducted on a sample of 100 people. On the basis of this sample, twenty people per village were selected for ethnomycological surveys. All investigated villages sharing the same dialect (Anii). For ethnomycological surveys we have sampled fresh specimens from Pésésoulou reserve forest. For some specimens, professional pictures were taken directly into

the field for illustration purposes. The sampled specimens have been used to make semi-structured and structured interviews in order to have reliable identifications because several fungi had very close morphology. We also used a photo guide of edible mushrooms compiled from previous works (De Kesel *et al.* 2002; Yorou *et al.* 2002) to complete the diversity we collected in the field. The collected specimens were dried after preliminary morphological features according to the protocol of De Kesel *et al.* 2002. To conduct this survey, a detailed questionnaire containing the main topics (different uses, preferences, availability, habitat of edible fungi) to be addressed was elaborated (Kesel *et al.* 2002; Eyi-Ndong *et al.* 2011).

2 Results

2.1 Diversity and exploitation of mushrooms

The examination of the ethnomycological enquiries data allow to draw up a list of 27 edible species for Pénésoulou district. The table 1 presents the complete list of WEF with their local name in Anii language, their availability and the appreciation of the local population.

Table 1: list of WEF of Pénésoulou district

	Scientific name	Locale name	Appreciation	Availability
1	<i>Termitomyces letestui</i>	Assintchounou	+++	**
2	<i>Volvariella volvacea</i>	Boupakoko	++	**
3	<i>Termitomyces clypeatus</i>	Krouguidanou	+++	**
4	<i>Psathyrella tuberculata</i>	Boukokopi/lkpakpabié	+++	***
5	<i>Chlorophyllum molybdites</i> cf.	Agougou	+	**
6	<i>Cantharellus solidus</i>	N'Gnonkrasangatoh	+++	***
7	<i>Amanita crassiconus</i>	Assilimèhkoko	+	*
8	<i>Termitomyces schimperi</i>	Ayarikoko/Ayarikpakpa	+++	*
9	<i>Amanita masasiensis</i>	Awawakoko/Awawakpakpa	++	**

10	<i>Volvariella earlei</i>	Apelikoko	+	***
11	<i>Termitomyces clypeatus</i>	Guitèh	++	***
12	<i>Cantharellus platyphillus</i>	Boukokorimè	+	*
13	<i>Lactifluus gymnocarpoides</i>	Atchélikoko	++	**
14	<i>Unknown 1</i>	Awangara	+	*
15	<i>Unknown 2</i>	Iwandoh	+	*
16	<i>Unknown 3</i>	Anakpé	++	**
17	<i>Unknown 4</i>	Apotoropo	+	*
18	<i>Unknown 5</i>	Ganinnèrè	++	***
19	<i>Unknown 6</i>	Alorimè	++	**
20	<i>Unknown 7</i>	Gafoulotina	+	*
21	<i>Unknown 8</i>	Gourèkoko	++	**
22	<i>Unknown 9</i>	Gatchiritoto	+	**
23	<i>Unknown 10</i>	Issamakoko	++	**
24	<i>Unknown 11</i>	Yoriyori	+	*
25	<i>Unknown 12</i>	Atchirisonto	++	*
26	<i>Unknown 13</i>	Madjiguigmana	+	**
27	<i>Unknown 14</i>	akobokoko	+	*

2.2 Habitat and ecology of edible mushrooms of Bassila area

The fungi collected for this study belong to three biological groups and mostly saprotrophic and symbiotic (ectomycorrhizal or associated with termites named Termitomyces). As indicated by the information obtained from the local populations, we have collected saprotrophic mushrooms on dead woods and leaves, and litter mix soil. Thus, these fungi are found in cultivated fields as well as in forests. Most of the ectomycorrhizal species were collected from their partner trees (*Isobertinia doka*, *Uapaca somon*, *Azelia africana*) in forest prospected. *Termitomyces* species are collected near termite mound. In addition to these biological groups, local populations reported the use of parasite macrofungal. These mushrooms are sheltered by forests and fallows.

2.3 Abundance, availability and assessing of mushrooms and dissemination of knowledge

From this ethnomycological survey, we reported two uses of wild mushrooms by the populations of the Pénésoulou district. These uses include food and medicinal purposes. On the basis of the information received, the species most appreciated by the local population are in decreasing notably: *Termitomyces shimperi*, *Termitomyces letestui*, *Psathyrella tuberculata* and *Cantharellus solidus*. For these populations, these species have great nutritional importance and are valid substitutes for animal source of proteins such as bushmeat, poultry and fish. In terms of availability and abundance, the surveyed population mentions *Volvariella earlei*, *Termitomyces clypeatus*, *Psathyrella tuberculata*, *Cantharellus solidus* and 'Ganinèrè' (unknown species 5) as most abundant species. But these species are also the most exploited. Rare species are: *Cantharellus platyphillus*, *Termitomyces shimperi* and *Amanita crassiconus* (Table 1).

In Pénésoulou, the collection of wild edible mushrooms is done by any person without distinction of sex or age but by the farmers. The level of knowledge of these farmers varies from one respondent to another. In fact, the respondent who has less information told us three wild edible mushrooms and the one who knows well about wild edible mushrooms cited eighteen. In addition, the study reveals that belonging to a farmer group or a large family is associated with more knowledge of wild edible mushrooms. Being part of a community of people who are familiar with wild edible mushrooms makes it possible to learn more about these mushrooms and to discover new ones.

2.4 Medicinal mushrooms use

In the study area, only one species of mushroom was listed as medicinal. This is "gourèkoko" used in the treatment of several diseases: burns, muscle pain, nerve and heart disease.

2.5 Composition and origin of local names of wild mushrooms

The inhabitants of the region of Pénésoulou have a good knowledge of the species delimitation. The generic name of mushrooms is completed by an epithet often related to:

- **Habitat:** “Gouwawakoko” which means mushroom of *Uapaca somon*, “Atchélikoko” which means mushroom of *Afzelia africana*;
- **Morphology:** “Asintchounou” which means long like the dog's intestines, “Ayarikoko” which means mushroom of the kings,
- **Taste:** “N Gnonkrasangato” which means tough and very soft; “krouguidanou” which means eating one's own tongue because of its flavor,
- **Ecology:** “Gourèkoko” which means mushroom of *Parkia biglobosa*, “Boupakoko” which means mushroom of *Eleais guineensis*.

3 Conclusion

This study reveals that “Pénéssoulou” population has an important knowledge about WEF. This knowledge is well shared among members of farmer groups or large families. In total a directory of 27 species of WEF has been established, one for medicinal use and the others for food. Of this list, 13 have been identified and 14 have not a scientific name. Among the species with scientific name matches, three are currently very rare. These are *Cantharellus platyphillus*, *Termitomyces schimperi* and *Amanita crassiconus*.

4 Acknowledgement

I thank the communities of Pénéssoulou, Pénélan, Kodowri, Nagayilé and Bodi for their availability, help and cooperation during this survey. I thank Ramdan Dramani, Bérence R. Houssouvo and Francine T. Olobo for their effort during the data collection. We are very grateful to Rufford Small Grant that funded the project N°27719-2

Annexes



Picture 1: Ethnomycological surveys with some people



Picture 2: Some edible mushroom: *Termitomyces shimperi*



Picture 2: Some edible mushroom: Amanita masasiensis



Picture 3: Mushroom for medicinal purposes (*Parkia biglobosa* parasite)