STUDY OF SOME MACROMYCETES MUSHROOMS; IN THE ATLAS CEDAR FORESTS OF THE BELEZMA MASSIF (BATNA, ALGERIA)

دراسة بعض فطريات الماكروميسات بغابات الأرزالأطلسي ببلزمة(باتنة،الجزائر)

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RESUME

La richesse mycologique du massif de Belezma demeure très mal connue, car n'a jamais fait l'objet d'un inventaire. Ainsi ; cette étude porte sur l'étude du cortège fongique des cédraies dont l'objectif d'obtenir une liste la plus complète possible d'espèces de la zone considérée, dans le cadre d'un état des lieux initial de la fonge.

La reconnaissance de la flore fongique a été faite sur une série de critères, à savoir les caractères morphologiques d'identification qui sont observés à l'œil nu et approfondies au laboratoire à l'aide d'une loupe binoculaire, des caractères organoleptiques tel que la couleur, saveur, odeur, toucher ; ont été ainsi déterminés et en fin des critères microscopiques à l'aide des coupes microscopiques au niveau des structures anatomiques.

Notre étude, a permis d'inventorier 51 espèces dont 98.06 % de cette fonge appartient à la division de Basidiomycètes et 1.94 % aux Ascomycètes. Parmi ces dernières ; 49 espèces ont été décrites pour la première fois dans la région du parc national de Belezma. La majorité des espèces rencontrées sont caractérisées des rôles importants et diversifiés.

MOTS CLES: Fonge, morphologique, microscopiques, spore, Ascomycètes, Basidiomycètes, Belezma.

ABSTRACT

The phanerogamic flora of cedar forests that belonging to Belezma massif - Batna (Algeria) was partially studied; however its mycological richness remains largely unknown because it has never been inventoried. Thus; this study aimed to the investigate of the fungic procession of the cedar forests of which the objective to obtain the most complete possible list of species of the considered area ; fully as possible within the framework of an initial inventory of fungi.

The identification of fungal flora was based on a number of criteria, namely the macroscopic and microscopic morpphological characters, organoleptic characteristics such as the color, flavour, odor, touch; were thus determined and at the end of the microscopic criteria using the microscopic cuts on the level of the anatomical structures.

Our study allowed us to inventory 51 species 98.06% of these fungi belong to the division Basidiomycetes and 1.94% to the Ascomycetes. Of these; 49 species have been met for the first time in the National Park area. The majority of the found species have important and diverse roles.

KEYWORDS: Fungi, morphologcal, microscopic, spore, Ascomycetes, Basidiomycetes, Belezma.

1 INTRODUCTION

Without fungi, the forest ecosystem would be greatly disturbed in all its processes. So it is to mushrooms that the largest “vegetable” biodiversity belongs. The ignorance of these mushrooms is often due mainly to the fact that these fungi appear only in the autumn, with the profit of an underground life during which they pass completely unperceived. Despite this discretion; mushrooms take part at all levels in the developmental cycle of tree stands. Therefore; White rots degrading forest litter and in their absence, mineral elements would be scarcely available and plant nutrition significantly slowed down; as a result, forest productivity would be significantly reduced [42].

Mushrooms therefore play a key role in the forest ecosystem, which can be summed up in the woody decomposition mainly by saproxylic fungi ; according to [53]; with more than 1500 species form the most diversified group, the recycling of different forms of organic matter namely; Litter, stumps, dead wood.etc, and through which carbon and nitrogen transfers are ensured between soil and litter [25], as well as through symbiotic action, facilitation of the mineral nutrition (nitrogen, the phosphate..); and the water supply for they mobilize the water captured by their mycelial filaments and which the host can also benefit. Moreover, they constitute excellent indicators of the fertility of the environment [25]. The predominance of a group of mushrooms (saprophytes, parasites, symbiotic.etc) can give an idea of the health status of the settlements, and finally, Thus it is thanks to the valorization of the fungal potential, such as the edible species and of good culinary value, that the amenagist, the herbalist can draw a substantial income from the mushroom harvest [42].

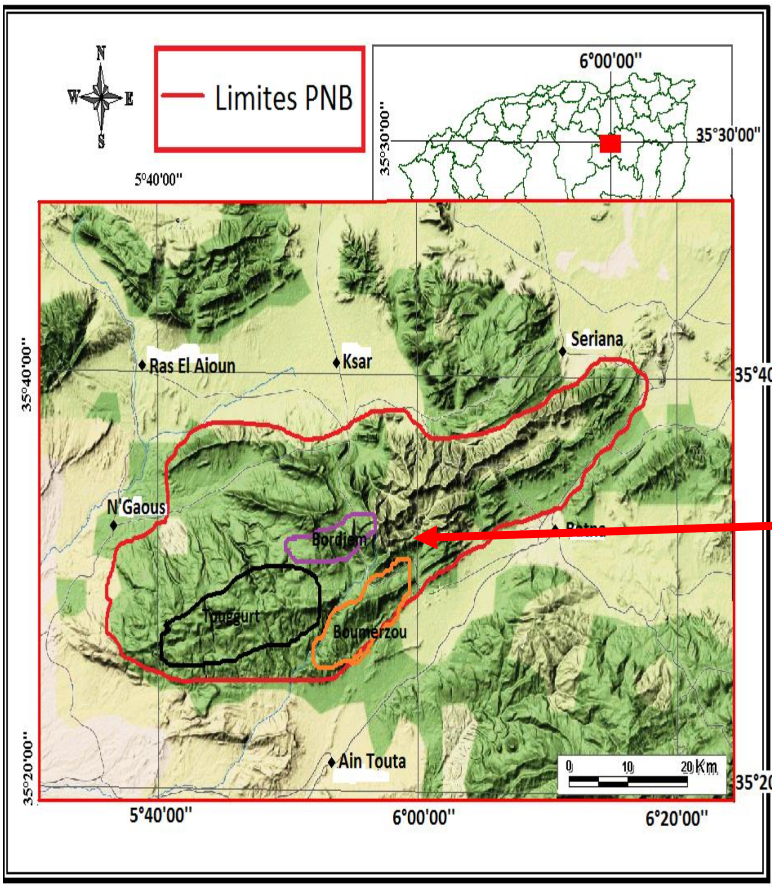
Comparatively to the phanerogamic flora of the forests of Belezma which has been partially studied [7, 14, 28, 33 and 51], its fonge is poorly known , because never was the object of an inventory. What is known at the present time of this diversity is in fact only a list of species recorded during the outings of prospecting in cedar habitats by the the forest agents [42]. There is therefore a lack of inventories to confirm the fungal originality of this habitat, likely to reveal a strong patrimonial interest.

The objective would be to obtain a list of species of the considered area, as complete as possible within the framework of an initial inventory of the actual state, in order to compare this list to other sites or follow it in time. However, taking into account the very a large number of forest mushroom species and of at the same time random and fugacious character of appearance of the sporophores (fructifications), aiming at the exhaustiveness of the species implies to multiply considerably the number of passages on site but one is limiting by time. Consequence of this constraint, the protocol will have to define a sampling strategy. It should also specify the taxonomic field (the selected groups, according to various criteria of relevance) as well as the time devoted to the inventories (for optimal standardization and reproducibility).

2 MATERIAL AND METHODS

2.1 Methodological contraintes and hoices

Given the size of the park's cedar area (Figure 1), the very acute relief and other conditions that limit us, the definition of the mycological protocol incorporates the constraint of a deliberately limited inventory time. Besides, the resource of specialists is fundamentally low. In the context of this limited field time, the mycological protocol operates two methodological choices: 1 ° it favors the harvesting of all the species of fungi encountered within our plots; 2. It is based on a selection from the plots studied.



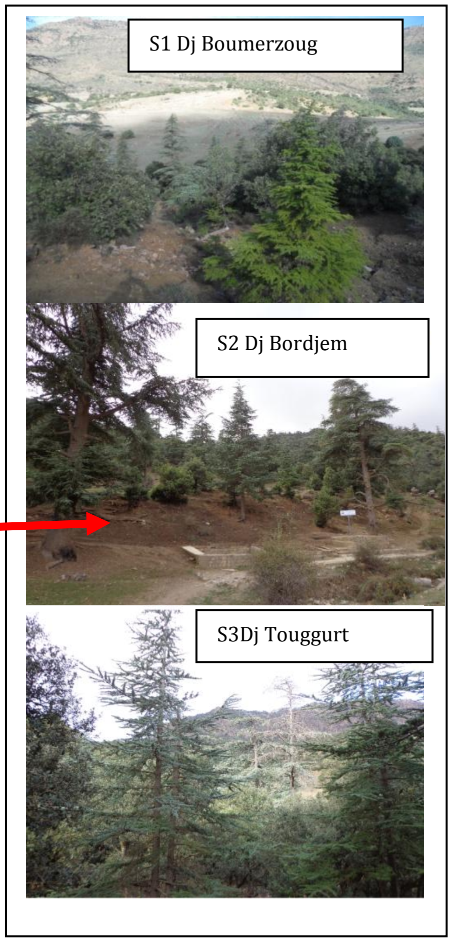


Fig. Carte de situation de la zone d'étude "PNB" Google Map modifiée

2.2 Methodology

In order to contribute to the determination of fungal diversity in the Belezma forests, prospections were carried out in this region. Harvests of the Ascomycetes and Basidiomycetes mushrooms were carried out in 2008 to 2010, in late summer and autumn, in the period considered most favorable for fruiting. These investigations were carried out on a mixed formation; in *Cedrus atlantica* and *Quercus ilex*. For the collection of carpophores, we randomly sampled different cedar stations in this protected area. No appreciation of the visited areas was carried out (prospecting differents localities). In the field, some indications concerning the species and its habitat are highlighted, that is to say the substrate on which they exist (wood or soil), manner of carpophores development (isolated, in troops...).

Thus, we collected mushrooms by precise and direct observation. The technique consists in taking pictures for the species found, before digging it out with a knife and then using a plastic bag. We hold them by hand in a way that they put inside the bag without damaging it (preserve the complete specimen). The specimens of mushrooms harvested were brought back the same day to the laboratory to identify them.

2.3 Material and technique of identification

The recognition of fungi was made on a series of criteria:

- Morphological identification characters (macroscopic) are observed with the naked eye and deepened in the laboratory using a binocular magnifying glass. General appearance with the state of the hat, the foot, the blades, the thickness and consistency of the flesh, the ornamentation of the specimens, and other remarkable features before the fungus dries up;

- Organoleptic characteristics: color (cuticle, blades, foot, flesh, sporohal), taste, odor, touch (dry cuticle, viscous, leathery or fibrous); have been determined. All these various criteria were studied on fresh specimens.

Similarly, microscopic criteria for species identification were determined from microscopic sections in anatomical structures.
Thus, cuts in the coating, flesh and hymenophor were carried out and observed under a microscope. The observation of the spores and the determination was made from the spores of the sporohal. With the tip of a razor blade and a lanceolate needle, we plucked a pinch of spores

from the sporohal. This one is deposited in a drop of water or mounting liquid.

To make sure the results, for each species; the harvest takes place in several specimens of different ages, for the volve, the ring, the initial color of the blades, the cortina, are always better visible at the young stage; on the other hand, the sporohal is expressed only in the adult stage [12]. This sporohal was obtained by depositing the ripe carpophores on sheets of paper of different colors and on glass slides, to obtain with certainty the color of the deposit. Here we have based on a principle estimate its color by transparency, at an angle, towards a light or dark source.

Thus, the determination of the natural coloring of the spores was carried out by comparing the coloration of the spore with the color of the white ordinary chalk. This latter and, according to [21], is the reference color for white spores. Finally, the systematic study of the collected species was based on the habitat, the ecology and the macroscopic characteristics of the specimens of each species. The criteria of determination are carefully noted. At the laboratory, the study of the samples is supplemented by microscopic data.

This identification was carried out at the scale of the genus and sometimes at the species level by researchers from the scientific and technical research center on the arid regions of Biskra (CRSTRA), and contribution of some mycologists from the laboratories of the " University of Mohammed V Casablana Morocco on the basis of determination keys and guides on mushrooms: [30, 6, 12, 13, 26, 27, 41, 50, 16, 48, 54 and 55]. In addition the edibility and the medicinal use of the identified species were confirmed by consulting the sites reported after the bibliographic part. The analysis is carried out in a global way with all the harvests of all the sites.

3 RESULTS AND DISCUSSION

Despite the limited number of 4 outings devoted to mushroom collection, we were able to collect 51 different species of which 9 species are not identified (Figure 2). Thus during this inventory it was possible to identify; 29 non-valued mushrooms, 14 edible species, 6 toxic species and 2 medicinal species (Table 1).

Table 01: List of mushrooms collected in the cedar forests of Oued El Chaâba and Oued El Ma (Belezma National Park) (S1: Montain of Boumerzoug S2: Montain of Bordjem S3: Montain of Touggurt)

N°	Family	Species	S1	S2	S3	UICN Category	Interest
			Number				
1	*Lycoperdaceae*	*Lycoperdon molle*	+	+	-	DD	Non -valued
2	*Lycoperdaceae*	*Lycoperdon pyriforme (NS)*	-	+	+	DD	Edible
3	*Lycoperdaceae*	*Lycoperdon perlatum (NS)*	+	-	+	DD	Edible at young age
4	*Agaricaceae*	*Bovista sp (NS)*	+	-	+	DD	Edible
5	*Mycenastraceae*	*Mycenastrum corium (NS)*	-	+	+	DD	Non -valued
6	*Geastraceae*	*Geastrum pectinatum (NS)*	-	+	-	DD	Non -valued
7	*Geastraceae*	*Geastrum striatum (NS)*	+	+	-	DD	Non -valued
8	*Geastraceae*	*Geastrum floriforme (NS)*	+	-	+	DD	Non -valued
9	*Agaricaceae*	*Coprinus comatus (NS)*	+	+	+	DD	Edible
10	*Agaricaceae*	*Lepiota Rhacodes (NS)*	-	+	+	DD	Toxic
11	*Agaricaceae*	*Lépiota procera*	+	+	+	DD	Edible
12	*Agaricaceae*	*Leucogaricus pseudocinerascens (NS)*	+	+	+	DD	Non -valued
13	*Agaricaceae*	*Agaricus essettei (NS)*	-	-	+	DD	Edible
14	*Agaricaceae*	*Agaricus subfloccosus (NS)*	+	+	+	DD	Toxic
15	*Agaricaceae*	*Leucagaricus macrorhizus (NS)*	-	+	+	DD	Toxic
16	*Tricolomataceae*	*Clitocybe graminicola (NS)*	+	+	+	DD	Toxic
17	*Tricolomataceae*	*Clitocybe phaeophthalma (NS)*	+	+	+	DD	Non -valued
18	*Tricolomataceae*	*Leucopaxillus paradoxus (NS)*	-	+	+	DD	Non -valued
19	*Hygrophoraceae*	*Hygrophorus cossus (NS)*	+	+	+	DD	Non -valued
20	*Cortinariaceae*	*Hebeloma ebumeum (NS)*	+	-	+	DD	Non -valued
21	*Tricolomataceae*	*Clitocybe niyea (NS)*	+	-	+	DD	Non -valued
22	*Hygrophoraceae*	*Hygrophorus camarophyllus*	+	+	-	DD	Edible
23	*Cortinariaceae*	*Hebeloma circinans (NS)*	-	+	+	DD	Non -valued
24	*Hygrophoraceae*	*Hygocybe mucronella (NS)*	+	+	-	**EN**	Non -valued
25	*Marasmiaceae*	*Mycena algeriensis (NS)*	+	+	-	DD	Non -valued
26	*Psathyrellaceae*	*Coprinus disseminatus (NS)*	+	+	+	DD	Non -valued
27	*Marasmiaceae*	*Mycen aflosnivium (NS)*	+	+	-	DD	Non -valued
28	*Marasmiaceae*	*Mycena albidolilacea (NS)*	+	-	+	DD	Non -valued
29	*Marasmiaceae*	*Collybia dryophila (NS)*	-	+	+	DD	Edible medium
30	*Cortinariaceae*	*Hebeloma cavipes (NS)*	-	-	+	DD	Non -valued
31	*Cortinariaceae*	*Hebeloma flammuloides (NS)*	-	+	+	DD	Non -valued

32	*Cortinariaceae*	*Hebeloma anthracophilum (NS)*	+	+	-	DD	Non -valued
33	*Cortinariaceae*	*Cortinariu sarellanus (NS)*	-	+	+	DD	Toxic
34	*Cortinariaceae*	*Hebeloma favrei (NS)*	+	-	+	DD	Non -valued
35	*Tricholomataceae*	*Leucopaxillus cerealis (NS)*	-	-	+	DD	Non -valued
36	*Tricholomataceae*	*Clitocybe lituus (NS)*	-	+	+	**EN**	Non -valued
37	*Polyporaceae*	*Trametes multicolor (NS)*	+	+	+	DD	Toxic
38	*Polyporaceae*	*Trametes versicolor (NS)*	+	-	+	DD	Used in medicine
39	*Grifolaceae*	*Abortiporus biennis (NS)*	-	+	+	**VU**	Non -valued
40	*Stereaceae*	*Stereum hirsutum (NS)*	+	+	+	DD	Non -valued
41	*Hymenochaetaceae*	*Phellinus sp (NS)*	+	+	+	DD	Used in medicine
42	*Marasmiaceae*	*Armillaria sp. (NS)*	+	+	+	DD	Non -valued
43	*Hymenochaetaceae*	*Phellinus torulosus (NS)*	+	+	+	**CR**	Non -valued
44	*Pezizaceae*	*Peziz sp (NS)*	+	+	+	DD	Non -valued
45	*Boletaceae*	*Xerocomus chrysenteron (NS)*	+	+	+	DD	Edible medium
46	*Boletaceae*	*Boletus sp (NS)*	-	+	+	DD	Edible medium
47	*Agaricaceae*	*Agaricus sp (NS)*	-	+	-	DD	Edible
48	*Amanitaceae*	*Amanite sp (NS)*	-	+	+	DD	Maybe edible
49	*Amanitaceae*	*Amanite sp (NS)*	+	+	-	DD	Maybe edible
50	*Agaricales*	*Lepista sp (NS)*	+	-	+	DD	Edible
51	*Stereaceae*	*Stereum purpureum (NS)*	+	+	+	DD	Non -valued
TOTAL			**33**	**39**	**41**		

(NS): Not reported in the liste of Mushroom of the Belezma National Park.

(**CR:** Critically Endangered, **EN:** Endangered,

VU: Vulnerable, **DD:** Data deficient)

From the specific richness point of view and with 41 species the mountain of Touggurt remains the richest in mycological diversity, followed by the mountain of Bordjem and Boumerzoug with values of 39 and 33 species of fungi respectively (Table 1).

Figure 02: Some specimens of mushrooms harvested in the cedar trees of the national park of Belezma (Photos: H.BOUKERKER 2009-2010) (1 : Lycoperdon molle, 2: Lycoperdon perlatum, 3 :Pezizasp, 4 :Bovistasp, 5 : Mycenastrum corium, 6 : Geastrum pectinatum, 7 : Geastrum striatum, 8: Geastrum floriforme, 9:Coprinus comatus, 10:Xerocomus chrysenteron, 11 : Boletus appendiculatus, 12 : Boletus impolitus, 13 : Boletus venenatus, 14 :Macro lepiota procera , 15 :Lepiota rhacodes, 16 : Agaricus sp, 17 :Lipoiota procera, 18 :Tricholoma album, 19 :laccaria tortilis, 20 : Clitocybe graminicola)

The mushrooms of the park, to name only the families, has 51 species (50 species for Basidiomycetes and 1 species for Ascomycetes.) The most diversified family for Basidiomycetes is Agaricaceae with 9 species divided into 5 genus, whereas the only family (Pezizaceae) belonging to the Ascomycetes contains only one species, namely Peziz sp.

Figure 3 gives the distribution of the fungal flora of the Belezma National Park according to mycological divisions, 98.06% belongs to the Basidiomycetes division and 1.94% the Ascomycetes.

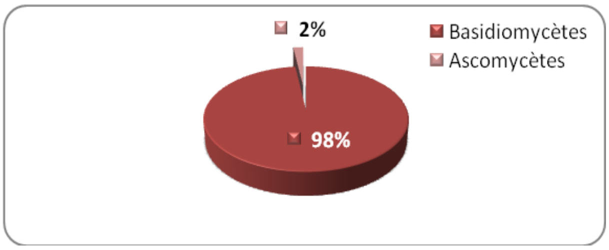


Figure 03: Divisional distribution of fungal flora in Belezma National Park

The Basidiomycota division (Figure 4) is more diverse, with 16 families distributed as follow: Agaricaceae (62.5%), Tricolomataceae (37.5), Cortinariaceae (43.75%), Marasmiaceae (31.25%), (Geastraceae, Hygrophoraceae, Lycoperdaceae, Amanitaceae, Polyporaceae, Hymenochaetaceae, Boletaceae and Stereaceae) with a value of (12.5%). Finally, the families of Mycenastraceae, Psathyrellaceae, Grifolaceae and Pezizaceae have a reduced value of (6.25%).

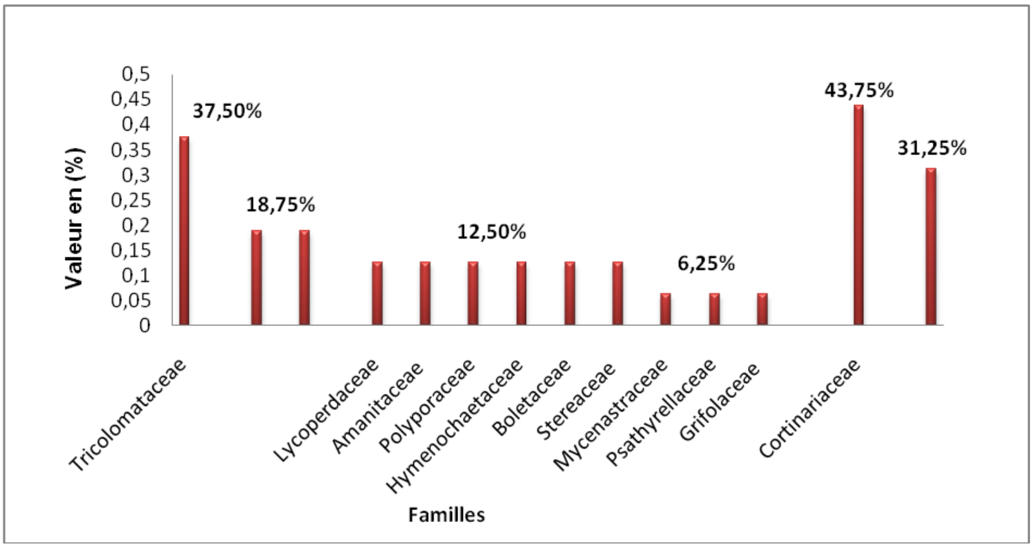


Figure 04: Distribution of Basidiomycete families in Belezma National Park

The division of the Ascomycetes is the least diversified compared to that of the Basidiomycetes, with only one family being that of Pezizaceae with a value of 6.25%

In the course of this work, the number of certain kinds collected in the visited places is very small, and are represented in our results by only one species, to know; *Armillaria sp, Bovistasp, Mycenastrum corium, Hygocybe mucronella, Collybia dryophila*, Boletus sp, Cortinarius arellanus, Abortiporus biennis, and Xerocomus chrysenteron; for Basidiomycetes and Peziz sp for Ascomycetes.

Among the species of the cedar forests encountered for the first time in the park compared to those repported in the park management plan (2006-2010); one quotes 49 species as; mentionned in table 1.

These results indicate both that the mushrooms in this protected area therefore remains little studied and the softness of the park's climate is probably the determining factor for the existence of these species in the forest where they find favorable climatic conditions to their development. [3], studying the factors related to the composition in fungal species of a stand of Fagus sylvatica has arrived at the results that, the factors that favor the propagation of the fungi are initially the parameters especially edaphic (soil pH) and climate variables (annual average temperature).

These results remain satisfactory and can be explained by the lack of data and work in the region. Therefore, we can consider this work as a first mycological prospecting and the results obtained can be used as a database.

Given the lack of data on mycological inventories in Algeria, particularly in Belezma National Park, we compared our findings with the work done by [35, 36] in North Africa (Algeria, Tunisia and Morocco), the works of [37, 9, 10, 11] in Morocco, as well as the recent work of Moroccan mycologists, [19, 46, 45, 44].

We can see from the results obtained (Fig. 4) that the list of fungal species established during our surveys has only some few resemblances (common species) and therefore is quite different from the crops made by the authors cited above; as well as specific species for each inventory work. This is probably due to various factors; among which the works of [9, 37] as well as the works of [9, 10] were carried out in Morocco, at the level of the atlas medium with a remarkable other biotic and abiotic conditions. Moreover the duration of the work carried out by MAIRE, BERTAULT and MALENÇON was spread over a 20 years, added to the climate change observed over the last ten years. We may also attribute these differences in the results to the environments and species surveyed in our work that are sometimes totally different from those chosen by the authors.

The lifestyle of fungi is rarely included in the definition of fungal associations defined by the mycosociologists [23, 18, 2]. However, Functional ecology puts in opposition saprotrophic and mycorrhizal species as actors of the biological functioning of ecosystems, particularly in forest systems [15, 43].

In view of this aspect, the species presented in this work are characterized by important and diversified roles. Indeed, the Phellinus kind is as for it thus counts among the pathogenic species (saprophytes and multi parasites) causing white rot so they break down the wood lignin, as for Phellinus chrysoloma, that infects mainly the heart wood of the Atlas cedar but saves the sapwood [13, 21].

The presence of Armillairia sp and a number of fungi known as parasites, which are mostly lignivores and are growing in unfavorable conditions prevailing in the cedar forest, such as, Tramets versicolor and species of Genus phellinus[11, 14, 27].

As for as the genus Armillaria mushroom is one of many terrestrial species that feed mainly on dead wood (saprophyte). Armillaries also contribute to the decomposition of wood and other woody substances. Other species are formidable parasites capable of colonizing live trees and causing death or rotting their trunk and roots. These mushrooms mainly frequent stressed trees [10].

The attak by Phellinus genus may cause on the trunks of the standing Cedar; the cubic decays of brown to red but also more damages are observed following the attack of Phellinus chrysoloma on Cedrus atlantica in Morocco [27].

A mycorrhizal procession probably very partial given the encountered climatic difficulties, for [2], has showed that fungal composition species depends directly on climate variables (annual average temperature), however certain richness must be mentionned in representatives; *Cortinarius arellanus, Amanita sp and Boletus sp.*

A procession of saprophytic fungi that feed on degrading dead organic matter, whether humicoles (decomposing soil organic matter) or terricoles (may survive in the soil for several years in the form of sclerotia). These mushrooms feed on organic matter in decomposition and they are considered as formidable forests cleaners [34]. The products of this synthesis constitute a source of food for other species. Thus the biodegradation of organic matter and the formation of humus are ensured by the collaboration between this group of fungi and certain bacteria. These saprophytes can be presented in our work by *Agaricus spp., Agaricus subfloccosus, Geastrum pectinatum, Geastrum striatum, Geastrum floriforme, Lepiota Rhacodes, Lepiota procera, Lycoperdon molle, Lycoperdon perlatum.*

Thus; the presence of saproxylic related to "old forest" may be correlated to a certain continuity of a large forest area, with natural growth patches, protected by topographical and geomorphological conditions limiting human disturbance [20].

In the forest ecosystem, the most diverse group of saproxylic fungal communities is the main decomposers of dead wood in forests [30]. They are able to create different ecological niches and provide resources and habitat for many other organisms, through the degradation of recalcitrant wood components such as lignin, cellulose and hemicelluloses [25].

Thus, it can be said that despite the current state of degradation of the Cedar forests of the park, these last still retain a very interesting fungal richness; It is for this reason that these cedar trees are of particular interest from the mycological point of view, which must be studied, since no mycologist has until now had the possibility of attaching himself to study this local fungi.

Interms of patrimonial richness; and given the lack of data on the heritage value of the macromycetes of North Africa, and given the unavailability of a specific red list for this area, we have based our estimation of the Belezma National Park species on the work carried out in Europe.

Therefore, we found that it would be much more interesting to compare our work with those of the red list of threatened upper fungi in Switzerland SENN-IRLET et al., 2007) in [52], Which was established by applying the criteria and adopting the categories proposed by IUCN (2001) in [52]. The regionalization procedure follows the guidelines of IUCN (2003) in [52], based on the work of GÄRDENFORS (2001) in [52].

Of the 51 species inventories and identified at the Belezma National Park, we have (Fig.5):

- 01 species (1.96 %) Critically Endangered (CR), it concerns Phellinus torulosus which can be considered as a species in the margin of its area of distribution based on the criteria applied by UCIN (see Chapter A3).

- 02 species (3.92 %) are in danger (EN), these are Clitocybe lituus and Hygrocybe mucronella.
- 01 species (1.96%) considered to be vulnerable (VU) is the Abortiporus biennis.
- Due to insufficient information, 51 species (92.15%) could not be classified (DD).

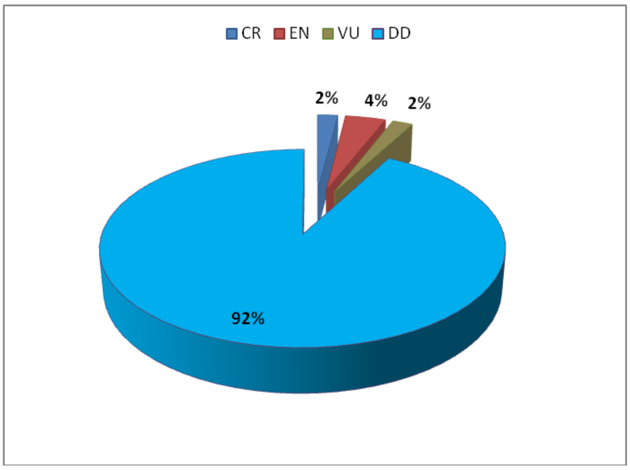


Figure 05: Distribution of species between categories designated by IUCN (CR: Critically Endangered, EN: Endangered, VU: vulnerable, DD: could not be classified) Data deficient

Al this data confirms on the one hand the certain rarity and therefore the need to conserve these taxa and their environment. The results obtained during the mycological surveys carried out during our prospections the importance and the necessity of carrying out regular campaigns to detect other taxa.

In general, the results obtained from the heritage value of the harvested species are still preliminary, as this is the first inventory carried out in the region, and no list has been established before to be able to compare the presence and the regression of species.

However, we can see that endangered species are found in all environments, and we believe that the loss of habitats, are conditioned by human activities in recent years, which is one of the major reasons for the observed decline in populations, as the majority of higher fungi are related to forest biotopes.

Thus the high number of non-valued fungi (29 species); we encourage the recommendation to guide researchers and scientists to achive the quantitative and qualitative study of the chemical composition and biological activity of cedar forests mushrooms including anti-cancer, anti-inflammatory and immuno-stimulating. This research will enable the valorisation of fungi by the development of new active ingredients for the pharmaceutical, nutraceutical and cosmetic industries.

It can be said that this study is the first step of an important field of investigation on the potential "Mushrooms" of the cedar forests of Belezma National Park. The repercussions under consideration of this research are many and important, both for the individual picking and of companies gatherers in their prospecting and marketing activities for major pharmaceutical and cosmeceutical company in product development for the benefit of human health.

Finally we can say that the study of fungi in the cedar forests of Belezma National Park, made it possible to inventory 51 species, a figure still far from reality, because the appearance of the fruiting bodies (carpophores) remains suspended with biotic and abiotic factors, and also because of the likely richness of this heritage, which shows the difficulty of knowing the actual presence or absence of certain species. But apart from this work, the result of which constitutes an essential database to understand the current fungal richness, the whole territory of the park remains largely unexplored. An integrated approach to managing this capital is therefore necessary to ensure the conservation of this heritage.

4 CONCLUSION

The study of the mushrooms of the cedar forests of the Belezma national park, made it possible to inventory 51 species (50 species of Basidiomycetes and 1 species of Ascomycetes); of which 49 species were described for the first time in the park area; therefore not repported in the park management plan (2006-2010).

Thus, despite the low number of the visited sites and the climatic conditions of the autumns of 2010, 2011 and 2012 that were unfavorable to the fruiting of the fungi, this work has revealed the originality of the Cedar Belezma fungic procession. At the limit of our knowledge, it has also led to a better knowledge of fungi associated with the Cedar trees of this protected area.

As long as the appearance of fungi remains dependent on the environment factors, as well as huge surface of the park, and the difficulty of traversing it in favorable conditions for inspecting the development of certain species of opportunistic fungi; The number of fungi inventories remains far from reality. Moreover, in order to better understand and recognize the park's richness in terms of enriching the park's database and their future development, other well-organized exploration outings in space and time are required to fill these Gaps.

Therefore, we can understand that our crops are diversified and contain the majority of taxa known in mycology; so , the Belezma National Park, is a very rich area from the mycological point of view, not only with the number of taxa harvested; Which has yet to be completed, but also with the diversity of taxonomic groups.

The species presented in this work are characterized by important and diversified roles (phytopathogenic, saprophytes species and parasites pluriannual, a mycorhizian procession, and saproxylic fungi).

Thus the results obtained concerning the interest of the various fungi inventorize in the Cedar forests; encourages us to undertake in-depth studies on their chemical composition and on certain properties, such as shelf life and concentration of active ingredients, depending on their geographical location.

As regards analysis of the results and viewing the sensitivity and the fragility of the park's cedar forest, which shelter this fungic heritage characterized by drastic stationary conditions; has to know its situation in the extreme south of the park by constituting the last rampart against the desert, its very broken grounds and its squelletic nature, the prolonged drought characterizing the area, and which resulted in a very high rate of dieback of the cedar; thus threatening the sustainability of this forest ecosystem and all its biodiversity, we recommend some proposals and measurements for a management which we see adapted to the conservation of the habitat and particularly of this fongic diversity.

During silvicultural work (clearances, depressions, thinnings outs, cuts, etc.), silvicultural practices that precipitate the disappearance of species should be avoided, above all, and clear-cut, systematic cut or the cut of no economic trees value. In particular, to promote and maintain the diversity of forest species mixed stands and especially underwoods species, which are essential for the development of fungi, lichens, vascular flora, insects and others.

To choose to regenerate by small perforated or gardening makes it possible to permanently maintain a cover and a density of big trees that constitute a favourable elements to forest diversity (flora, fungiflora, insectes.etc).

Thus, taking into account the gaps and of the limited effects of the regulation, it is necessary to base on the sensitizing and the education of the forests users of public on the ecological mushrooms importance and with the respect of the environment and finally to convince the public of the need for conserve nature for better preserving and developing its resources.

In the end no one doubts today the need to protect fungi as long as they are linked to plants or trees to which they are associated. In the event of the disappearance of these plants, the symbiotic fungi can disappear, all the more easily if these fungi are linked to a single species or group of specific species.

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