

THE URBAN BIODIVERSITY OF M'SILA CITY (ALGERIA)

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Abstract: *The objective of this study is to analyze the urban biodiversity of the city of M'sila geographical space limited to the northeast of the province. The green framework of the city of M'sila manifests itself in two forms: private and public green spaces very diversified in terms of flora and fauna. In this context, the methodology adopted is an inventory of the taxonomic diversity of this green framework. The city of M'sila presents a very important flora and vegetation which contains 119 species belonging to 49 families and 103 genera. From the biological and morphological type point of view, the tree stratum is the most dominant with 37%, shrubby (35%) and the herbaceous stratum has more than 28%. In ethnobotany, multiple uses of the species are medicinal, toxic, ornamental and foods are recorded. The faunal inventory of the city of M'sila lists 50 species belonging to 33 families and 16 orders, of which the class of insects is the most dominant. In conclusion, field observation on the one hand showed a great difference in specific richness between the different sites studied in the city of M'sila and, on the other hand, there is a degradation of several gardens and green spaces such as the Ahmed Madaghri garden and the November 1, 1954 garden.*

Keywords: *Urban ecosystem, biodiversity, flora and fauna inventory, M'sila, Algeria.*

1. Introduction

Today, about 80% of the population resides in urban areas. Biodiversity in the city largely depends on the promotion of green spaces, which has become an absolute necessity for maintaining the quality of life of the population. The preservation and development of urban biodiversity can only have beneficial effects at the ecological, aesthetic, social and even psychological level, by improving the well-being of the inhabitants [1]. Very few research works concern the biodiversity of the urban ecosystem of the city of M'sila. It is in this vision that the objective of this present work is the presentation of the taxonomic biodiversity of some gardens and green spaces of the city of M'sila, it is based on the floristic inventory, the faunal inventory and the management of this biodiversity.

2. Materials and Methods

2.1 Presentation of study area

Our investigation area is located in the eastern center of Algeria, which covers an area of 18,718 km². It is made up of 47 municipalities grouped into 15 divisions (Fig. 1). The M'sila region is located at an altitude of 500 m, is geographically located between 35°42'07" N 4°32'49" E. The climate of the investigation area is of the continental type subject in part to with Saharan influences [2]. The summer is dry and very hot while the winter is very cold, with low rainfall and irregular, it is around 100 to 250 mm/year. In addition, the study area is characterized by two ecosystems: forest and steppe. This feature gives M'sila the name of capital of Hodna.



Fig. 1. Location of the study area

2.2. Methodology

From March to May 2015, the flora and fauna inventory was carried out with the aim of establishing the list of flora and fauna. In addition, the inventory was limited around the gardens, green spaces and the main boulevards of the city. Botanical determinations were made by comparison with reference works devoted to flora and vegetation [3-6]. Regarding the fauna, determinations were made by specialists in entomofauna from the department of agronomic sciences of the University of M'sila.

3. Results and Discussion

3.1. Flora analysis

The inventoried plant species are divided into one hundred and nineteen species, forty-nine families and one hundred and three genera. The families with the greatest specific diversity are Asteraceae with fourteen species, Rosaceae, Fabaceae, Oleaceae, Malvaceae, Poaceae and Palmaceae with 11, 8, 7, 6 and 5 species respectively (Tab. 1).

Table 1: Frequencies of genera and species inventoried in the city of M'sila

Families	Number of Genera	Number of Species	Families	Number of Genera	Number of Species
Asteraceae	14	14	Solanaceae	1	1
Rosaceae	6	11	Zygophyllaeae	1	1
Fabaceae	8	8	Agavaceae	1	1
Oléaceae	4	7	Ampélidaceae	1	1
Malvaceae	4	6	Apocynaceae	1	1
Palmaceae	3	5	Araliaceae	1	1
Poaceae	5	5	Convolvulaceae	1	1
Apiaceae	4	4	Crassulaceae	1	1
Moraceae	2	4	Pittosporaceae	1	1
Liliaceae	3	3	Platanaceae	1	1
Cruciferae	3	3	Primulaceae	1	1
Nyctaginaceae	2	2	Punicaceae	1	1
Anacardiaceae	2	2	Acanthaceae	1	1
Bignoniaceae	2	2	Buxaceae	1	1
Cacteeae	2	2	Cannaceae	1	1
Césalpiniaceae	2	2	Euphorbiaceae	1	1
Cupressaceae	2	2	Lamiaceae	1	1
Verbenaceae	1	2	Lythraceae	1	1
Aizoaceae	2	2	Musaceae	1	1
Mimosaceae	1	2	Myrtaceae	1	1
Pinaceae	2	2	Oxalidaceae	1	1
Rutaceae	2	2	Papavéraceae	1	1
Passifloraceae	1	1	Thymeleaceae	1	1
Salicaceae	1	1	Rhamnaceae	1	1
Casuarinaceae	1	1	-	-	-

The morphological types listed are dominated by trees with 36% dominated by the following families: Fabaceae (*Acacia*, *Robinia*, *Sophora*), Palmaceae (*Washingtonia*, *Phoenix*) and Pinaceae (the Aleppo pine), followed by shrubs with 35% dominated by the following families: Oleaceae (*Jasminum*), Apocynaceae and Rosaceae then herbaceous with 29% dominated by the families *Asteraceae* and *Poaceae* (Fig. 2).

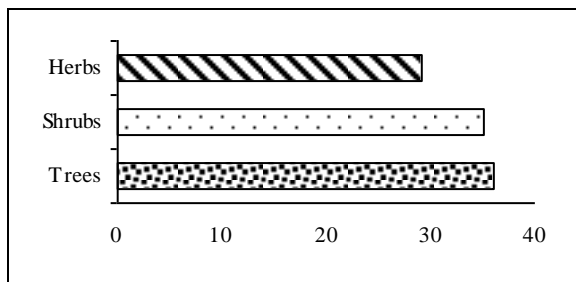


Fig. 2. Stratification of the flora of M'sila city.

The analysis of the floristic inventory identifies several types of plants such as:

Food plants: *Ceratonia siliqua*, *Citrus limon*, *Ficus carica*, *Malus pumila*, *Opuntia ficus-indica*, *Phoenix canariensis*, *Prunus domestica*, *Prunus armeniaca*, *Punica granatum* et *Vitis vinifera*.

Ornamental plants: *Casuarina equisetifolia*, *Eucalyptus globules*, *Ceceus peruvianus*, *Opuntia*

ficus-indica, *Ricinus communis*, *Hisbiscus rosa-sinensis*, *Lantana camara* et *Canna indica*.

Poisonous plants: *Nerium oleander*, *Peganum harmala* et *Spartina townsendii*.

Medicinal plants: *Pistacia lentiscus*, *Ferula communis*, *Hedera helix*, *Calendula officinalis*, *Matricaria recutita*, *Sonchus arvensis*, *Bellis annua*, *Chrysanthemum coronarium*, *Scolymus hispanicus*, *Ceceus peruvianus*, *Opuntia ficus-indica*, *Ceratonia siliqua*, *Moricandia arvensis*, *Didesmus aegypticus*, *Erysimum grandiflorum*, *Cupressus sempervirens*, *Ricinus communis*, *Rosmarinus officinalis*, *Malva moschata*, *Malva parviflora*, *Hisbiscus rosa-sinensis*, *Ficus carica*, *Morus alba*, *Musa Sapientum*, *Eucalyptus globules*, *Olea europaea*, *Jasminum angulare*, *Fraxinus velutina*, *Papaver rhoeas*, *Rossiflora coerulea*, *Pinus helenpensis*, *Punica granatum*, *Prunus domestica*, *Malus pumila*, *Citrus limon*, *Populus nigra* et *Peganum harmala*.

The presence of very many trees along the Boulevards presents a degradation in particular at the level due Boulevard (Larocade-Ichebilia), this situation is due to the lack of interest on the other hand the boulevard (BBA-Bou Saada) remains the best laid out (Tab. 2).

Table 2: The alignment trees of the Boulevards of the M'sila city

Species names	Boulevard (Larocade – Ichebilia)	Boulevard (College central - University pole)	Boulevard (BBA -Bou Saada)
<i>Schinus molle</i>	121	95	257
<i>Morus alba</i>	57	132	56
<i>Skimmia japonica</i>	13	77	21
<i>Pinus helenpensis</i>	-	8	-
<i>Eucalyptus globules</i>	-	16	52
<i>Pistacia lentistul</i>	62	65	1
<i>Washingtonia robusta</i>	33	2	23
<i>Washingtonia filifera</i>	57	17	278
<i>Phoenix canariensis</i>	13	-	168
<i>Phoenix dactylifera</i>	2	8	8
<i>Olea europaea</i>	-	58	10
<i>Cupressus sempervirens</i>	-	11	23
<i>Casuarina equisetifolia</i>	3	-	78
<i>Daphne gnidium</i>	11	24	-
<i>Platanus orientalis</i>	1	1	20
<i>Fraxinus pennsylvania</i>	7	12	-
<i>Sorbus aucuparia</i>	2	-	-
<i>Acacia sp</i>	3	9	08
<i>Nerium oleander</i>	-	-	133
Total : 19 espèces	385	535	1136

3.2. Fauna analysis

The animal species inventoried are divided into fifty species, thirty-three families and sixteen orders (Fig. 3). These results are obtained following the application of different capture methods, although some species have escaped

capture and identification. The Hymenoptera order is the most represented with 9 species followed by the Beetles order with 6 species. In addition, the group of Insect species dominates this fauna diversity of this study (Tab.3-4).

Table 3: Inventory of fauna diversity in the M'sila city

Order	Families	Species names
Hymenoptera	Formicidae	<i>Cardiocondyla sp, Camponotus ligniperda, Larius nigre</i>
	Apidae	<i>Apis mellifira, Xylocopa violacea</i>
	Vespidae	<i>Paravespula vulgaris, Polistes gallicus</i>
	Sphecidae	<i>Sceliphron destillatoruim, Ammophila sabulosa</i>
Diptera	Muscidae	<i>Muscidae sp</i>
	Calliphoridae	<i>Lucilia caesar</i>
Heteroptera	Pyrrhocoridae	<i>Pyrrhocoris apterus</i>
	Miridae	<i>Deraeocoris ruber</i>
	Lygaeidae	<i>Lygaeus saxatilis scopli, Heterogaster</i>
Beetles	Chrysomelids	<i>Clytra quadripunctata</i>
	Coccinellids	<i>Coccinella algerica, Coccinella septempunctata</i>
	Tenebrionidae	<i>Adesmia sp</i>
	Carabidae	<i>Carabus glabratus</i>
	Tenebrionidae	<i>Blaps sp</i>
	Cerambycidae	<i>Acanthocinus aedilis</i>
Embioptera	Forficulidae	<i>Forficula auricularia</i>
Orthoptera	Orthoptera	<i>Acrotylus sp</i>
	Catantopidae	<i>Miramella alpina</i>
	Tetrigidae	<i>Tetrix subulata</i>
Lepidoptera	Pieridae	<i>Gonepteryx rhamni, Pieris sp, Pieris brassicae</i>
	Nymphalidae	<i>Araschnia levana</i>
	Caterpillar	<i>Cossus Cossus</i>
Arachnid	Araneidae	<i>Araneide sp.1, Araneide sp.2</i>
Gastropods	Helicidae	<i>Helicidae sp, Cernuella virgata</i>
Columbiforms	Colombidae	<i>Streptopelia senegalensis, Streptopelia decaocto, Columba livia</i>
Riforms	Passeridae	<i>Passer domesticus, Passer hispaniolensis, Passer domesticus hispaniolensis, Serinus serinus</i>
	Turdidae	<i>Turdus merula</i>
	Corvidae	<i>Corvus corax</i>
Ciconiiforms	Ciconiidae	<i>Ciconia ciconia</i>
Bucerotiforms	Upupidae	<i>Upupa epops</i>
Anseriforms	Anatidae	<i>Anser sp.</i>
Carnivores	Felines	<i>Felis sp.</i>
Lagomorphs	Leporidae	<i>Oryctolagus cuniculus</i>

Table 4: List of insects identified in the M'sila city

Species names	Families	Species names	Families
<i>Apis mellifira</i>	Apidae	<i>Forficula auricularia</i>	Forficulidae
<i>Adesmia sp</i>	Tenebrionidae	<i>Gonepteryx rhamni</i>	Pierides
<i>Acanthocinus aedilis</i>	Cerambycidae	<i>Larius nigre</i>	Formicidae
<i>Acrotylus sp</i>	Orthoptera	<i>Lucilia caesar</i>	Calliphoridae
<i>Ammophila Sabulosa</i>	Sphecidae	<i>Lygaeus saxatilis scopli</i>	Lygaeidae
<i>Araschnia levana</i>	Nymphalidae	<i>Miramella alpina koll.</i>	Catantopidae
<i>Blaps sp</i>	Tenebrionidae	<i>Muscidae sp</i>	Muscides
<i>Camponotus ligniperda</i>	Formicidae	<i>Paravespula vulgaris</i>	Vespidae

<i>Carabus glabratus</i>	Carabidae	<i>Pieris sp</i>	Pierides
<i>Cardiocondyla sp</i>	Formicidae	<i>Pieris brassicae</i>	Pierides
<i>Clytra quadripunctata</i>	Chrysomelids	<i>Polistes gallicus</i>	Vespidae
<i>Coccinella algerica</i>	Coccinellidae	<i>Pyrrhocoris apterus</i>	Pyrrhocoris
<i>Coccinella septempunctata</i>	Coccinellidae	<i>Sceliphron destillatorum Illiger</i>	Sphecidae
<i>Cossus Cossus</i>	Caterpillar	<i>Tetrix subulata</i>	Tetrigidae
<i>Deraeocoris ruber</i>	Miridae	<i>Xylocopa violacea</i>	Apides



1 : *Acanthocinus aedilis* 2 : *Forficula auricularia* 3 : *Pieris brassicae* 4 : *Columba livia*
5 : *Cerutuella virgata* 6 : *Deraeocoris ruber* 7 : *Blaps sp* 8 : *Acrotylus sp* 9 : *Passer domesticus*

Fig. 3. Some fauna species of the M'sila city

3.3. State of green spaces

The most represented plant species in the sampled sites are: *Schinus molle*, *Cupressus sempervirens*, *Morus alba*, *Rosa* sp, *Bougainvillea glabra*, *Daphne gnidium*, *Skimmia japonica* and *Phoenix* sp. A variation of the floristic diversity marks certain sites of significant richness (the university of M'sila, the

green space of the courthouse (Chahid) and the green space of the city of 500 dwellings), but other sites present a net degradation (the green space of the November 1, 1954 garden, green space linked to the Theatre, green space near the Ben Tabi promotion and the Ahmed Madeghri garden (Fig. 4-5). But Chahid square remains among the sites sampled best equipped.



Garden 1st november Photo
in 1995 [7]



Garden 1st november Photo
« CHOUBAR et AICHE, 2012 »



Garden 1st november
Photo « SARRI M, 2015 »

Fig. 4. Dynamics landscape of the Garden 1st November in the M'sila city



Garden Ahmed Madeghri in 1995 [7]



Garden Ahmed Madeghri Photo « CHOUBAR et AICHE 2012 »

Fig. 5. Dynamics landscape of the Garden Ahmed Madeghri in the M'sila city

Conclusion

The biodiversity of the city of M'sila has made it possible to inventory 119 species belonging to 49 families and 103 genera. The tree stratum is the most dominant with 36%, shrubby (shrubs and shrubs) 35% and the herbaceous stratum accounts for 29%.

In signal, a great variation of specific richness, between the various zones and sectors of the town of M'sila and the degradation of several gardens and green spaces like the garden Ahmed Madaghri and the garden of November 1, 1954. The faunal inventory of the city of M'sila lists 50 species belonging to 33 families and 16 orders, of which the class of insects is the most dominant.

The conservation, enhancement and management of this heritage, requiring the efforts of the institutions of the city M'sila and environmental associations, neighborhood associations and scientists so that this urban ecosystem offers us life services close to nature.

References

1. Bekkouch I., Kouddane N., Daroui E., Boukroute A., Berrichi A., Inventaire des arbres d'alignement de la ville d'Oujd. *Nature et Technologie*, 5 (2011) 87-91.
2. Le Houerou H.N., Bioclimatologie et Biogéographie des steppes arides du Nord de l'Afrique. Diversité biologique, développement durable et désertisation, option méditerranéennes série. B10, (1995).
3. Ozenda P., Flore du Sahara septentrional, Paris, Ed. CNRS, (1983).
4. Quezel P., Santa S., Nouvelle flore de l'Algérie et des régions désertiques méridionales, Paris, Centre national de la recherche scientifique, (1962-1963).
5. Blamey M., Grey-wilson C., Toutes les fleurs de Méditerranée, Lausanne, Édit. Delachaux et Nestlé, (1993).
6. Bayer E., Buttler K., Finkenzeller X., Grau J., Guide de la flore méditerranéenne, Paris, (2005).
7. Mili M., L'espace vert entre nécessités et enjeux : cas des espaces verts publics de la ville de M'sila. Mémoire de Magister. Gestion et Technique Urbaines. M'sila : Université Mohamed Boudiaf de M'sila, (2001). 249.