



INVENTORY OF ORNAMENTAL PLANTS AT THE CAMPUS OF IBN TOFAÏL UNIVERSITY, KENITRA (MOROCCO)

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Abstract

In order to assess the diversity and richness of the landscape heritage of the coastal city Kénitra based-Ibn Tofaïl University Campus, a floristic study on the ornamental forest was conducted in 2019 in place. The analysis of the flora diversity of the campus made it possible to identify 80 species and ornamental varieties of 40 families and 56 genera. According to the study of their origins, we note the presence of some native species as well as the dominance of non-native plants.

Keywords: Ornamental plants; inventory; Ibn Tofaïl University Campus (Atlantic Morocco).

Introduction

As part of its environmental-friendly policy and since its establishment, Ibn Tofaïl University has constantly expressed its interest in a university model combining openness and search for excellence. It has worked to protect the environment, develop eco-friendly energy technologies and to improve the aesthetic qualities of its landscape and preserve it. To meet these expectations, either in terms of beauty and functionality, the faculty administrative (policy-makers) members of Ibn Tofaïl, have undertaken many actions to enhance the attractiveness of the landscape and preserve its natural heritage including but not limited to a variety of native and non-native species.

Material and Methods

Study Zone

The present study was conducted within Ibn Tofaïl university campus. This area is located in the southeast of the

city of Kenitra (Atlantic Morocco) at the edge of the Maamora forest (Fig.1). It covers an area of 45 hectares. Its proximity to the Maamora oak grove and surrounding green spaces qualifies it among the greenest university campuses in Morocco.

From an ecological point of view, the site that is the subject of our study is classified as sub-wet land bioclimatic atmosphere; its soils is of sands of variable depth and clay; they rest on a substrate of Miocene marl or Pliocene sandstone (Fraval *et al.*, 1997). The average annual precipitation is 600 mm, with great inter-annual variability. The average temperature of the hottest month (August) is 27.5°C and the average of the coldest month (January) is 6.9°. The maximum monthly relative humidity is between 90 and 94% with minimums in summer and maximums in winter.

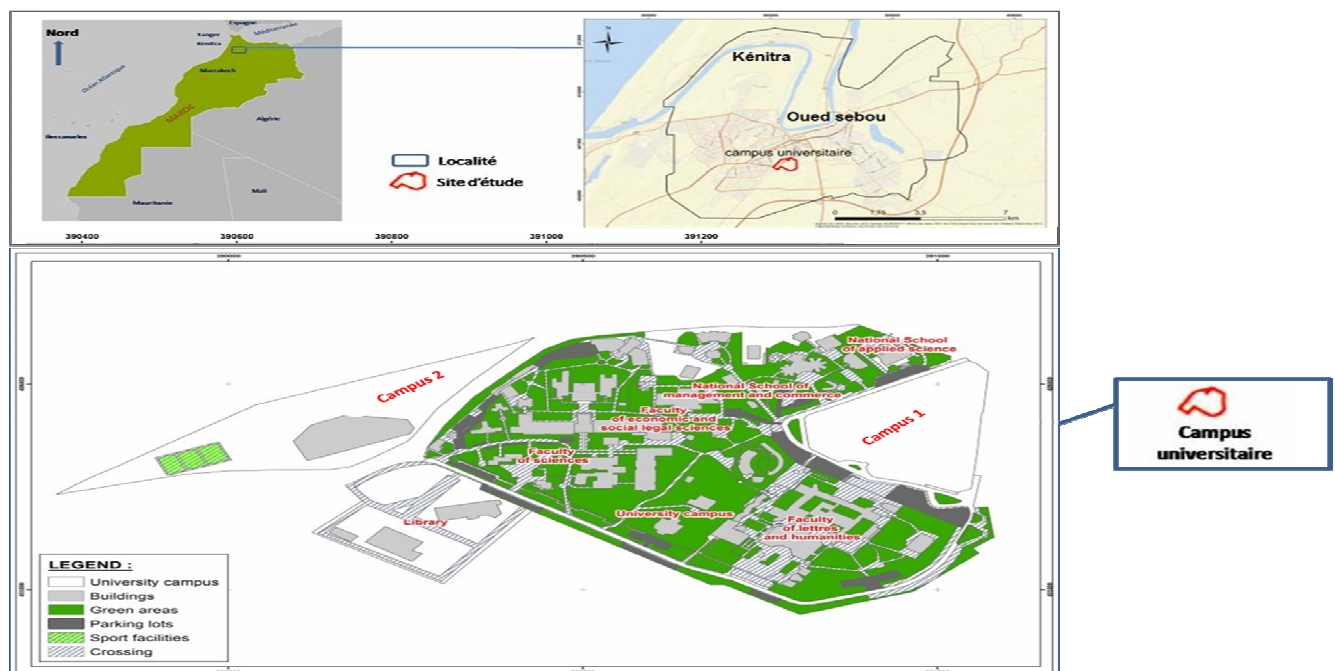


Fig. 1 : Map of the geographic location of the study area (the size of the green spaces the study covers).

Methodology

The inventory was carried out in 2019 by making a list of the green spaces the educational and administrative establishments of the university occupy. The ornamental taxa are identified via specific procedures and determination keys (El-Barnaoui, 2014; Cuisance *et al.*, 1980; Roy Lancaster, 1977; Belot, 1978; Byrd Graf, 1982; Lanzara *et al.*, 1978).

For each category, the species are grouped according to their morphological types (trees, shrubs, palm trees, lianas, succulents and herbaceous plants) and to their geographic distribution. The origin of each plant is identified; some plants are difficult to exactly determine their origins. The names of the taxa were corrected and updated after consulting the website. Illustrations of some taxa are given at the end of this article. Scientific names are followed by localities and geographic distribution.

Results and Discussion

80 ornamental taxa including 13 trees, 28 shrubs, 5 palm trees, 8 lianas, 11 succulents and 15 herbaceous plants were all listed in the final list. They were divided into 40 families and arranged in an alphabetical order for each group (trees, shrubs, palm trees, lianas, succulents and herbaceous plants).

(I) List of ornamental plants (indigenous / allochthonous) listed within Ibn Tofail University Campus in Kenitra (Atlantic Morocco).

1. Trees

- **Bignoniaceae**
Jacaranda mimosifolia D. Don
Native to the rain forests of Brazil and northwest Argentina
- **Fagaceae**
Quercus suber L.
Native to the Western Mediterranean
- **Leguminosae**
Erythrina caffra Thunb.
Native to southern Africa, east coast of Africa in South Africa.
- **Malvaceae**
Brachychitonpopulneus (Schott &Endl.) R.Br.
Native to different regions of eastern Australia
- **Meliaceae**
Melia azedarach L.
Native to India, southern China and Australia.
- **Moraceae**
Ficus retusa L.
Native to Indonesia
Ficuscarira L.
Native to a large area of warm temperate climate, encompassing the periphery of the Mediterranean basin to Central Asia.

Morus alba L.

Originally from China.

- **Oleaceae**

Olea europaea L.

Native to Africa.

- **Pinaceae**

Pinus halepensis Mill.

Native to the Mediterranean Basin-Macaronesia.

- **Platanaceae**

Platanus x acerifolia (Aiton) Willd.

It is a hybrid of the West Plane Tree (North America) and the East Plane Tree (West Asia, South East Europe), which appeared during the 18th century in Europe.

- **Rosaceae**

Eriobotrya japonica (Thunb.) Lindl.

Native to the Far East: China (Hubei, Sichuan), Japan, Taiwan.

- **Salicaceae**

Populus alba L.

Native to southern Europe and Asia.

2. Palms

- **Arecaceae**

Phoenix roebelenii O'Brien.

Native to Africa, Canary Islands, Crete, Middle East, India, China, Indonesia and the Philippines.

Phoenix canariensis Hort. Ex Chabaud.

Native to the Canary Islands.

Phoenix dactylifera L.

Native to the west of India or to the region of the Persian Gulf.

- **Syagrus romanzoffiana** (Cham.)

Glassman (*Cocos plumosa* Hook. F.)

Native to South America (Brazil)

Washingtonia robusta H. Wendl

Native to northwestern Mexico.

3. Shrubs

- **Apocynaceae**

Catharanthus roseus (L.) G. Don

Native to Madagascar

Nerium oleander L

Native to the Mediterranean basin.

Schefflera arboricola (Hayata) Merr.

Native to tropical Asia: Indonesia, Papua, New Guinea, and tropical Australia.

Schefflera actinophylla (Endl.) Harms.

Native to tropical Asia: Indonesia, Papua, New Guinea, and tropical Australia.

- **Asparagaceae**
Yucca aloifolia L.
Native to Mexico and the south of the United States.
Yucca gigantea Lem.
Native to Central America.
 - **Bignoniaceae**
Tecomacapsensis (Thunb.) Lindl.
Native to the oceanic borders of south-eastern South Africa, Swaziland and southern Mozambique.
 - **Celastraceae**
Euonymus japonicus Thunb.
Native to Japan.
Euonymus japonicus 'Aureus' Thunb.
Native to Japan and Korea, horticultural variety
Euonymus emerald Gaiet
Native to China, introduced to Europe in 1907.
 - **Cupressaceae**
Platyclusus orientalis L. (*Thuja orientalis* L.)
Native to eastern China, Manchuria and Korea.
 - **Euphorbiaceae**
Acalypha wilkesiana Muell. Arg' *Obovata'*
Native to the South Pacific islands (Bismarck Archipelago, Solomon Islands, Fiji Islands, Vanuatu).
 - **Lythraceae**
Punica granatum L.
Native to western Asia (Turkey, Iran, Iraq, Azerbaijan, Afghanistan, Pakistan), and probably the Arabian Peninsula, as well as northern Africa.
 - **Malvaceae**
Hibiscus rosa-sinensis L.
Asian origin (Southeast of China)
Hibiscus rosasinensis
Native to the Mediterranean.
Hibiscus rosasinensis 'white wings'
Native to Fiji Islands.
 - **Moraceae**
Ficus benjamina L.
Native to India and more generally Asian and oceanic.
Ficus 'Golden King'
Native to Asia
 - **Myrtaceae**
Callistemon viminalis (Sol. ex Gaertn.) G. Don
Native to South East Australia
 - **Oleaceae**
Ligustrum ovalifolium Hassk
Native to Japan and Korea.
 - **Rubiaceae**
Coprosma lucida J. R. Forst. & G. Forst.
Native to northeastern New Zealand.
 - **Rutaceae**
Citrus x aurantium L.
Originally from China, it has since become acclimatized all around the Mediterranean.
 - *Citrus limon* (L.) Osbeck.
Native to Asia, the south of the Himalayas.
 - **Strelitziaceae**
Strelitzia alba (L.f.) Skeels (*Strelitzia augusta* Thunb.)
Native to South Africa.
 - **Verbenaceae**
Duranta erecta L.
Native to Central America and the Caribbean
 - **Lantana camara** Medik
Native to South America and adapted to Mediterranean conditions.
Lantana camara 'Flava' (Medik.) Moldenke
Native to South America and adapted to Mediterranean conditions.
Lantana camara 'nivea' (Vent.) L.H. Bailey
Native to South America and adapted to Mediterranean conditions.
- #### 4. Lianas
- **Araliaceae**
Hedera helix L
Native to Africa and Asia.
 - **Nyctaginaceae**
Bougainvillea spectabilis Willd.
Native to Brazil or Peru.
Bougainvillea glabra Choisy
Native to Brazil and Mexico.
Bougainvillea glabra var. *alba* Mendes & Viégas
Native to Brazil.
Bougainvillea glabra flammealatum
Native to Brazil.
Bougainvillea × buttiana 'Golden Glow'
Native to Brazil and Mexico (South America).
 - **Plumbaginaceae**
Plumbago auriculata Lam.
Native to the Mediterranean. Originally, came from South Africa.
Plumbago auriculata f. *alba* (Pasq.) Z. X. Peng
Native to South Africa.

5. Succulent plants

- **Aizoaceae**
Carpobrotus edulis (L.) N.E.Br.
Native to South Africa.
- **Asparagaceae**
Agave americana L.
Native to Mexico.
Asparagus aethiopicus L.
Native to South Africa.
Agave americana var. *marginata* aurea Trelease
Native to North America and Central America.
- **Cactaceae**
Cereus hildmannianus K. Schum.
Native to tropical America.
Cereus repandus (L.) Mill.
Native to Mexico.
Opuntia ficus-indica (L.) Mill.
Native to Mexico.
- **Crassulaceae**
Aeonium arboreum Webb & Berthel.
Native to the Canary Islands and Morocco.
Aeonium arboreum var. *atropurpureum* (W.A. Nicholson) A. Berger;
Native to the Canary Islands.
Kalanchoe daigremontiana Raym. –Hamet & H. Perrier.
Endemic to Madagascar. It has been introduced as an ornamental plant in many tropical regions.
Bryophyllum fedtschenkoi (Raym. –Hamet & H. Perrier) Lauz.-March.
Native to Madagascar.

6. Herbaceous

- **Asparagaceae**
Chlorophytum comosum (Thunb.) Jacques
Originally from South Africa.
- **Compositae**
Euryops sp.
Originally from South Africa.
Gazania rigens (L.) Gaertn
Originally from South Africa.
Osteospermum ecklonis (DC.) Norl.
Originally from South Africa.
Tagetes erecta L.
Native to Mexico, Central America.
- **Geraniaceae**
**Geranium rostratum* DC. (*Pelargonium roseum* Willd).

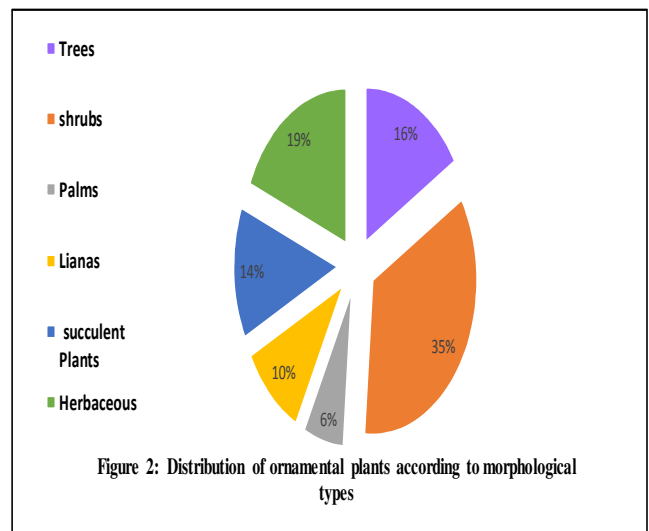
Native to South Africa.

- **Lamiaceae**
Rosmarinus officinalis L.
Native to the Mediterranean basin.
Lavandula x intermedia Emeric ex Loisel.
Origin: horticultural, from a cross between officinal lavender *Lavandula angustifolia* and *Lavandula latifolia*, lavande aspic.
Plectranthus neochilus Schltr.
Originally from South Africa.
- **Poaceae**
Stenotaphrum secundatum (Walter) Kuntze
Native to tropical and subtropical regions of the world. Warm regions of Africa and America.
Cortaderia selloana (Schult. & Schult. f.) Asch. & Graebn.
Native to the plains of South America.
- **Solanaceae**
Petunia axillaris (Lam.) Britton, Sterns & Poggenb
Originally from Argentina.
Petunia integrifolia (Hook.) Schinz & Thell
Native to South America.
Petunia Blueberry Star
Native to warm regions of South America.
Petunia 'vivabule'
Native to tropical regions of South America.

(II) Qualitative diversity

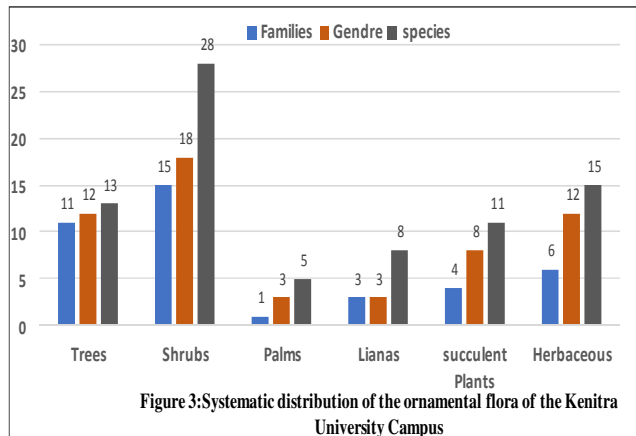
The ornamental flora of Ibn Tofaïl University Campus is represented by 80 species and varieties divided into 40 families and 56 genera.

Considering the criteria related to the morphology of the species, such as size and consistency; the ornamental flora of the university campus is characterized by six (6) morphological types: Trees, Palms, shrubs, lianas, succulent and herbaceous plants (Fig2).



The analysis of the inventoried flora shows that the shrubs and the herbaceous plants are the majority with respectively (29.15) species or (35%, 19 %) of the total flora of this study. Second in number is trees and succulents with (13.11) or 16%, 14 %) species and varieties, and lianas and palms with (8. 5) species, or 10%, 6 %).

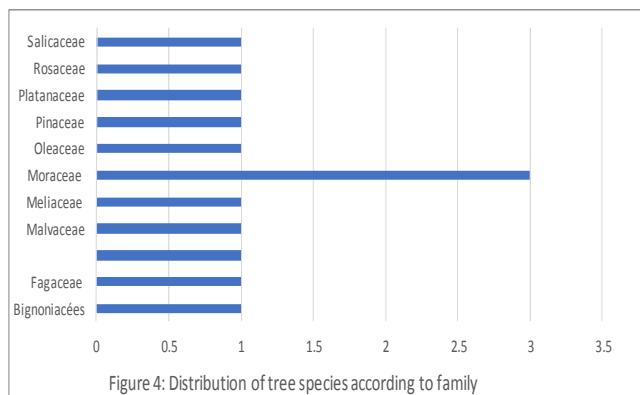
- For the group of trees, there are 13 taxa divided into 11 families and 12 genera.
- For the group of shrubs there are 28 taxa divided into 15 families and 18 genera.
- For the palms group there are 5 species divided into 1 family and 3 genera.
- For the group of lianas, there are 8 taxa divided into 3 families and 3 genera.
- For the group of succulents there are 11 taxa divided into 4 families and 8 genera.
- For the herbaceous group there are 15 species divided into 6 families and 12 genera (Fig. 3).



(III) Wealth of the main families of six groups

- The group of trees is represented by 13 species divided into 11 families:

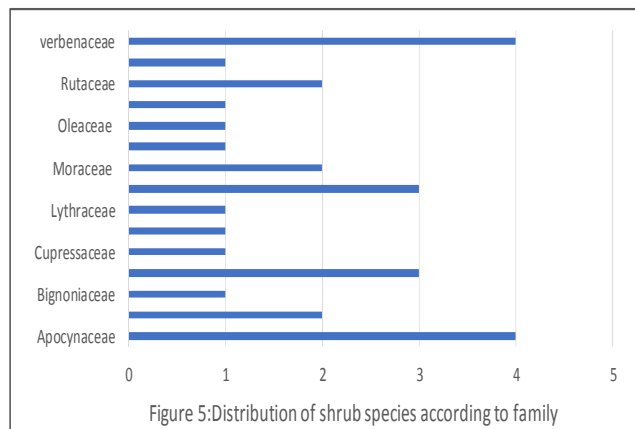
Bignoniaceae ; Fagaceae ; Leguminosae ; Malvaceae ; Meliaceae ; Moraceae ; Oleaceae ; Pinaceae ; Platanaceae ; Rosaceae ; Salicaceae. The best represented groups are the Moraceae, they count three species three (3). The *Bignoniaceae ; Fagaceae ; Leguminosae ; Malvaceae ; Meliaceae ; Oleaceae ; Pinaceae ; Platanaceae ; Bignoniacées ; Fagaceae ; Leguminosae ; Malvaceae ; Meliaceae ; Oleaceae ; Pinaceae ; Platanaceae ; Rosaceae ; Salicaceae* are represented by (1) one species each (Fig. 4).



- The group of shrubs is represented by 28 species divided into 15 families:

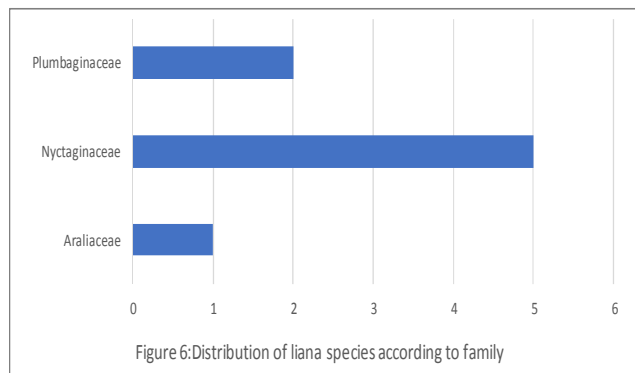
Apocynaceae; Asparagaceae; Bignoniaceae; Celastraceae; Cupressaceae; Euphorbiaceae; Lythraceae; Malvacées; Moraceae; Myrtaceae; Oleaceae; Rubiaceae; Rutaceae; Strelitziaceae; Vrbenaceae.

- The best represented groups are the **Apocynaceae**: they include 4 species from the group of shrubs.
- The **Celastraceae** and **Malvaceae** families are represented by three (3) species each.
- The **Moraceae** families; **Asparagaceae** and **Rutaceae**, are represented by two (2) species each.
- The families of **Bignoniaceae; Cupressaceae; Euphorbiaceae; Lythraceae; Myrtaceae; Lythraceae; Oleaceae; Rubiaceae; Strelitziaceae; verbenaceae** are presented by one species each (Fig. 5).



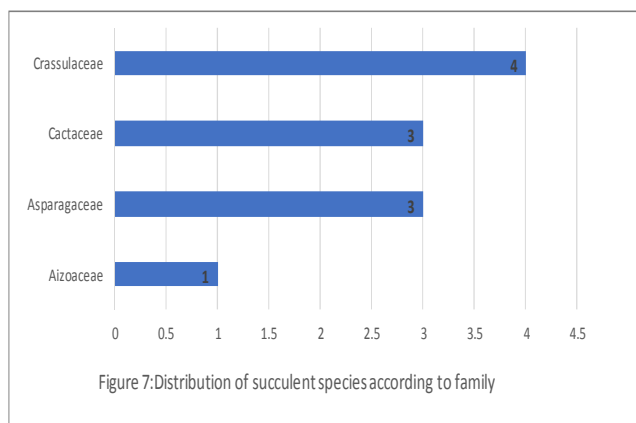
- The palm group is represented by five (5) species divided into a family: **Arecaceae**, it is represented by five (5) species.
- The group of **lianas** is represented by eight (8) species divided into three (3) families:

Araliaceae, Plumbaginaceae and **Nyctaginaceae**. The **Nyctaginaceae** family is the most represented: it has five (5) species of the liana group. The **Plumbaginaceae** family is represented by two (2) species (Fig. 6).

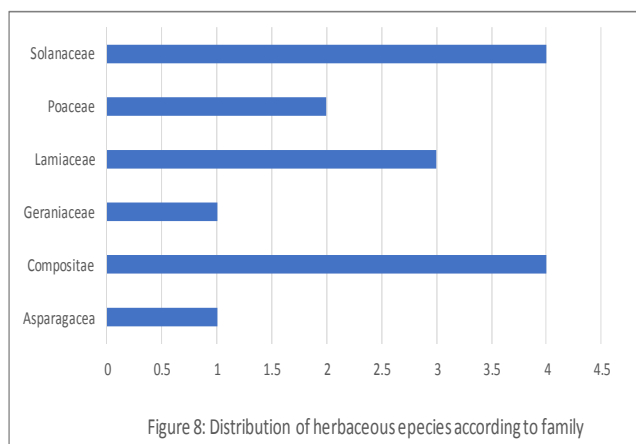


The group of succulents is represented by 11 species divided into 4 families: **Aizoaceae; Asparagaceae; Cactaceae; Crassulaceae**. The **Crassulaceae** family is the most represented; it has four (4) species, followed by **Asparagaceae** and **Cactaceae** with three (3) species each.

The **Aizoaceae** family is represented by a single species (Fig. 7).



The **herbaceous** group is represented by 15 species divided into 6 families: **Asparagaceae**; **Compositae**; **Geraniaceae**; **Lamiaceae**; **Poaceae**; **Solanaceae**. The families of **Compositae** and **Solanaceae** are the most represented: they have four (4) species of the herbaceous group, followed by the families of **Lamiaceae** with three (3) species. **Poaceae** is represented by two (2) species. The families **Asparagaceae** and **Geraniaceae** are represented by one (1) species each (Fig. 8).



Conclusion

At the end of this study, 80 ornamental species and varieties distributed among 40 families and 56 genera were

inventoried, testifying to the rich flora of the University Campus.

Considering the six identified morphological types (trees; shrubs; palms; lianas; succulents and herbaceous plants), shrubs and herbaceous plants are best represented with respectively (29, 15) species or (35%, 19 %) of the total flora of this study.

According to the origins, we note the presence of native species and the dominance of non-native plants.

Acknowledgments

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