



## Study of the Floristic Diversity of the Moulay Driss Zerhoun Region in the Prerif Range, Morocco

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**T**HE FLORISTIC diversity data of the Zerhoun region of Morocco are old and fragmentary. This study sets out to document the region's floristic composition and update the list of wild plants present. In total, 57 stands of 400 m<sup>2</sup> (20 m x 20 m) were surveyed to assess their floristic composition, which represents the vegetation diversity in the study area. In total, 407 taxa (species and subspecies) of vascular plants were recorded, representing 257 genera in 67 families, of which 16 species distributed among 10 families were considered new additions to the flora of Zerhoun. The most common families were Asteraceae, Fabaceae, Poaceae, Lamiaceae, Apiaceae, Caryophyllaceae, Rubiaceae, Brassicaceae, Geraniaceae, and Asparagaceae. Of the 257 total genera, the highest number of species belonged to *Trifolium* and *Teucrium*. Therophytes, hemicryptophytes, and phanerophytes were the most common biological types. The updated list of Zerhoun's flora will serve as the foundation for future research and a general baseline for establishing conservation action plans appropriate to the environmental sustainability of the region.

**Keywords:** Checklist, Morocco, Plant diversity, Zerhoun massif.

### Introduction

In continental North Africa, Morocco's botany is among the most well-investigated Fennane et al., 1999; Fennane & Ibn Tattou, 2005; Fennane et al., 2007, 2014; Dobignard & Chatelain, 2010–2013). It occupies an important place among Mediterranean countries because of the large number of species of vascular plants that it hosts, as well as its high percentage of endemic species (Médail & Quézel, 1997). About 18% of the plant diversity in the Mediterranean basin can be found in Andalusia (the southern half of the Iberian Peninsula) and northwest Africa (Morocco) (Molina-Venegas et al., 2013). According to the most recent study of Morocco's vascular flora, the country is estimated to support approximately 5,211 taxa (species and subspecies), of which approximately 17% are endemic (Fennane & Ibn Tattou, 2012; Dobignard & Chatelain, 2013;

Fennane, 2021). The exceptional plant diversity in Morocco can be explained by the country's geographical position and its varied topography, geology, ecoregion, and Mediterranean bioclimate (ranging from humid to Saharan).

Although a comprehensive estimate of the plants of Morocco was made only a few years ago, Fennane & Ibn Tattou (2012) and others believe that additional research into the floral composition of each of the 11 phytogeographic divisions (Fennane & Ibn Tattou, 1998) is necessary. This research should consider the precision of inventory counts, the systematic value of various taxa, their geographic distribution, ecology, biology, etc. (Benkhniue et al., 2010, 2022; Fennane & Ibn Tattou, 2012; Khamar et al., 2022).

Therefore, to compile a botanical inventory of the so-called "transitional zones" that lie between

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the 11 different Moroccan phytogeographic sectors that Fennane & Ibn Tattou (1998, 2005) have mapped, the Zerhoun region, a small portion of North Atlantic Morocco (called Man-1), was chosen as a model due to its position as an intermediate zone between the Rif (R) and the Middle Atlas (MA) on one hand and the Eastern Morocco plateaus (Op) and Gharb plain (Man-2) on the other. In addition, to the best of our knowledge, no strictly botanical study has been conducted in the Zerhoun area beyond the works of Sauvage (1933) and Emberger (1939). The most recent information on the region's inventoried vegetation is a list of 111 medicinal plants that are utilized by locals in traditional herbal medicine (Slimani et al., 2016). Given all of these considerations, additional floristic work is required to fill the gaps in our knowledge of this region's flora.

This study aims to provide an updated floristic list for the Zerhoun region along with a quantitative analysis of its floristic characteristics, biological life forms, and geographical distribution.

## Materials and Methods

### Study area

The study was conducted in the Moulay Driss Zerhoun region, about 25 km north of Meknes and

60 km west of Fez (Fig. 1). It is also about 4 km away from the old Roman city of Volubilis. The study region is at 34°03'21" North and 5°31'06" West and spanned an area of 55,800 ha. Administratively, it is considered part of the Wilaya of Meknes and is surrounded by the provinces of Sidi Kassem and Taounate to the north, the region of Dkhissa to the south, the province of Zouagha Moulay Yaakoub to the east, and the area of Ain Jema to the west (DPAM, 2013).

The climate in the Zerhoun region is typically Mediterranean, with very hot, dry summers and mild winters (Fig. 2). In total, 90% of the precipitation occurs between November and April. The yearly average rainfall ranges from 580–770 mm. The mean annual minimum and maximum temperatures are 11°C and 28°C, respectively (CCA 2018; Kmoch et al., 2018; Infoclimat, 2022). The relative humidity ranges from 75.12% in January to 48.33% in August (Climate-Data, 2022).

The Zerhoun massif has the general form of a monoclinal structure that dips to the north. The massif's altitude is varied, from the fertile plain west of Moulay Idriss Zerhoun (at an elevation of less than 300 m) to the almost 1000-m summit of Jbel Zerhoun.

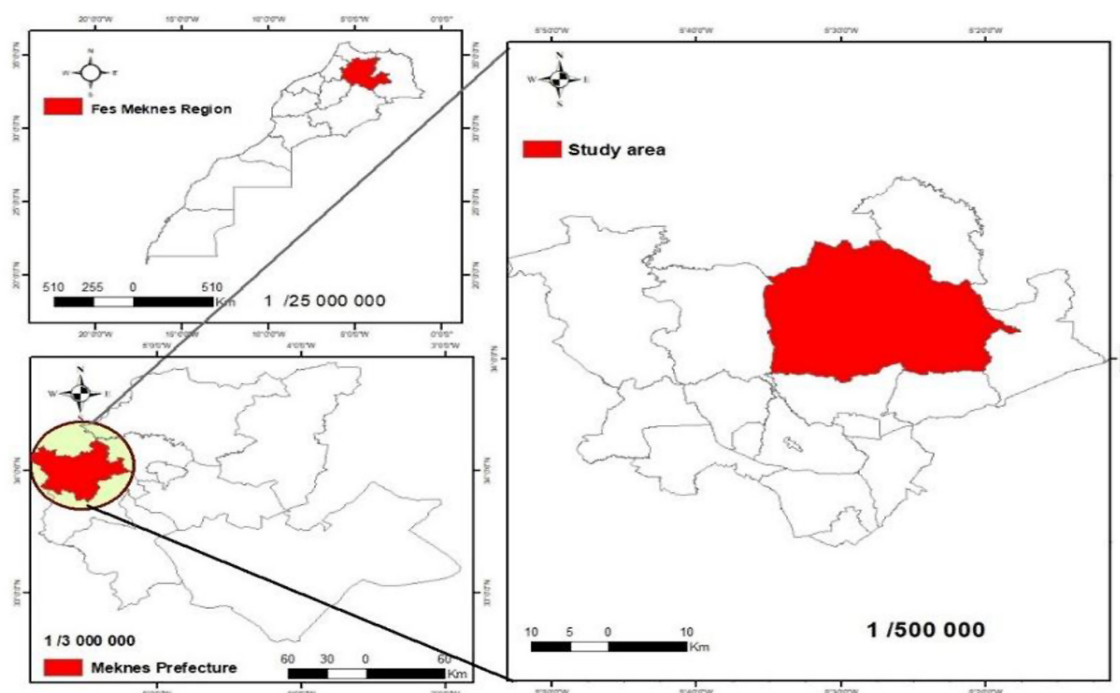


Fig. 1. Map of location of Moulay Driss Zerhoun region

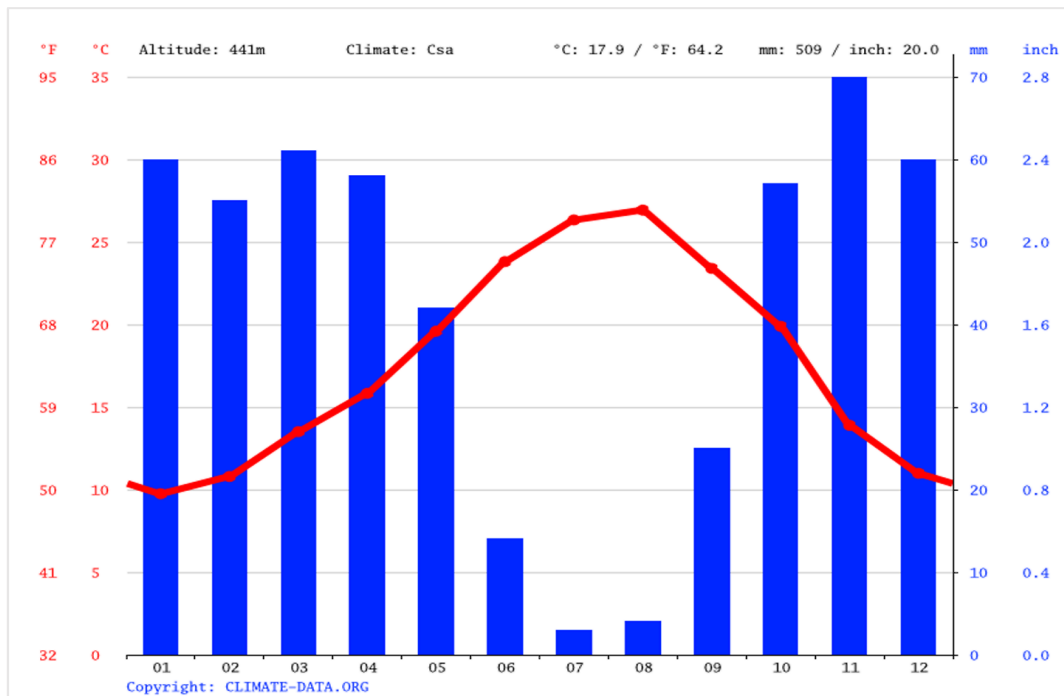


Fig. 2. Ombrothermic diagram of the city of Zerhoun based on data from 1991-2021 (modified after Climate-data, 2022)

The Zerhoun mountains are located within the territory of the pre-Rif wrinkles, which are located at the top of the middle Lias in the continental platform that surrounds the Hercynian reliefs in the center of Morocco (Dresch, 1930). This Jurassic series, which is characterized by mostly carbonate sedimentation, is completed by marlstone, limestone, and dolomite. Through the Moulay-Idriss fault, this structure connects to the Miocene or Jurassic of Fert et Bir, which is located to the north (Haddaoui et al., 1997). Sandstones with coarse grains that are cemented with carbonate are called Zerhoun sandstones (Harmouzi, 2010).

## Methods

### Sampling and data collection

To identify all of the plant species represented in the study region, the stratified sampling method was adopted. Surveys were accompanied by records of all ecological and phytosociological observations. The inventory and phytosociological study of the Zerhoun Massif plant species were conducted during March, April, May, and June 2022 at a rate of one week per month. Three factors—geology, exposure (north or south), and vegetation facies—were used to create the distinct strata. A total of 57 floristic stands

were surveyed (Fig. 3). Each floristic survey was conducted over a quadrat of 400 m<sup>2</sup> (20m x 20m). The geographical coordinates of the stands were recorded with GPS (Table 1). Plant identification was confirmed with the help of Practical Flora of Morocco (Fennane et al., 1999, 2007, 2014) and New Flora of Algeria and the Southern Desert Regions (Quèzel & Santa, 1962, 1963). The life form spectrum of the recorded species was defined according to Raunkiaer's classification system (1934). The nomenclature of plant taxa follows the International Plant Names Index (IPNI, <https://www.ipni.org/>), the Synonymic Index of the Flora of North Africa (Dobignard & Chatelain, 2010–2013), and the APG IV (Angiosperm Phylogeny Group, 2016). The determination of species as strictly endemic to Morocco or sub-endemic taxa that are common in neighboring countries was conducted per the Chorological Inventory of Vascular Plants of Morocco (Fennane & Ibn Tattou, 2005; Ibn Tattou & Fennane, 2008) and the Catalog of Endemic, Rare or Threatened Plants in Morocco (Fennane & Ibn Tattou, 1998). The conservation status of each taxon was noted according to the *Red Book of the Vascular Flora of Morocco* (Fennane, 2021).

**TABLE 1. Geographic coordinates, altitude, and type of substrate of the various surveys of Zerhoun region**

| Relevée | GPS coordinates        | Altitude (m) | Substrate                    |
|---------|------------------------|--------------|------------------------------|
| R1      | 34°1'35"N, -5°29'43"W  | 895          | Limestone                    |
| R2      | 34°1'27"N, -5°31'40"W  | 741          | marl-limestone               |
| R3      | 34°1'25"N, -5°31'56"W  | 699          | marl-limestone               |
| R4      | 34°4'33"N, -5°33'15"W  | 387          | Clay                         |
| R5      | 34°2'11"N, -5°29'32"W  | 826          | Limestone                    |
| R6      | 34°2'8"N, -5°29'44"W   | 897          | Limestone sandstone          |
| R7      | 34°1'53"N, -5°30'18"W  | 971          | Limestone                    |
| R8      | 34°1'54"N, -5°31'18"W  | 978          | Limestone sandstone          |
| R9      | 34°1'48"N, -5°31'23"W  | 871          | Limestone sandstone          |
| R10     | 34°1'55"N, -5°30'20"W  | 949          | Limestone sandstone          |
| R11     | 34°4'33"N, -5°27'29"W  | 713          | Limestone sandstone          |
| R12     | 34°3'49"N, -5°24'55"W  | 758          | Limestone sandstone          |
| R13     | 34°0'27"N, -5°23'44"W  | 1053         | Limestone sandstone          |
| R14     | 34°0'35"N, -5°24'11"W  | 975          | Limestone                    |
| R15     | 34°0'29"N, -5°24'14"W  | 1009         | Limestone                    |
| R16     | 34°0'54"N, -5°24'22"W  | 787          | Limestone                    |
| R17     | 34°0'21"N, -5°24'26"W  | 822          | Limestone sandstone          |
| R18     | 34°0'9.5"N, -5°25'20"W | 932          | Sandstone and marl-limestone |
| R19     | 34°1'10"N, -5°25'43"W  | 782          | Sandstone and marl-limestone |
| R20     | 34°1'33"N, -5°33'12"W  | 608          | Limestone sandstone          |
| R21     | 34°1'26"N, -5°32'23"W  | 678          | Limestone sandstone          |
| R22     | 34°1'25"N, -5°32'2"W   | 693          | Limestone                    |
| R23     | 34°0'45"N, -5°28'28"W  | 707          | Limestone                    |
| R24     | 34°0'12"N, -5°27'22"W  | 866          | Limestone                    |
| R25     | 34°0'15"N, -5°27'30"W  | 808          | Limestone                    |
| R26     | 34°0'14"N, -5°27'38"W  | 767          | Limestone                    |
| R27     | 34°8'50"N, -5°32'3"W   | 749          | Limestone                    |
| R28     | 34°1'11"N, -5°29'4"W   | 929          | Limestone                    |
| R29     | 34°2'5"N, -5°29'56"W   | 671          | Limestone                    |
| R30     | 34°3'11"N, -5°30'36"W  | 706          | Limestone                    |
| R31     | 34°3'8"N, -5°30'29"W   | 759          | Limestone                    |
| R32     | 34°3'2"N, -5°30'17"W   | 764          | Limestone                    |
| R33     | 34°3'1"N, -5°30'13"W   | 658          | Limestone                    |
| R34     | 34°3'50"N, -5°30'4"W   | 829          | Limestone                    |
| R35     | 34°2'43"N, -5°30'9"W   | 820          | Limestone                    |
| R36     | 34°2'33"N, -5°30'5"W   | 544          | Limestone                    |
| R37     | 34°4'3"N, -5°31'24"W   | 851          | Limestone                    |
| R38     | 34°1'18"N, -5°33'31"W  | 520          | Limestone                    |
| R39     | 34°2'37"N, -5°28'42"W  | 874          | Limestone                    |
| R40     | 34°3'41"N, -5°28'55"W  | 626          | Limestone                    |
| R41     | 34°2'57"N, -5°29'6"W   | 758          | Limestone                    |
| R42     | 34°3'11"N, -5°28'57"W  | 617          | Limestone                    |
| R43     | 34°1'36"N, -5°33'59"W  | 656          | Limestone                    |
| R44     | 34°3'30"N, -5°30'21"W  | 660          | Limestone                    |
| R45     | 34°3'26"N, -5°30'18"W  | 695          | Limestone                    |
| R46     | 34°5'5"N, -5°26'32"W   | 591          | Limestone                    |
| R47     | 34°3'3"N, -5°22'51"W   | 645          | Limestone                    |
| R48     | 34°4'34"N, -5°27'9"W   | 884          | Limestone                    |
| R49     | 34°1'12"N, -5°29'1"W   | 929          | Limestone                    |
| R50     | 34°1'13"N, -5°28'53"W  | 955          | Limestone                    |
| R51     | 34°0'2.7"N, -5°26'35"W | 922          | Limestone                    |
| R52     | 34°0'0.1"N, -5°26'32"W | 980          | Limestone                    |
| R53     | 34°0'0.5"N, -5°26'11"W | 895          | Limestone                    |
| R54     | 34°0'38"N, -5°26'27"W  | 409          | Marl-limestone               |
| R55     | 34°3'36"N, -5°22'29"W  | 605          | Marl-limestone               |
| R56     | 34°5'13"N, -5°26'30"W  | 687          | Marl-limestone               |
| R57     | 34°4'31"N, -5°27'19"W  | 661          | Marl-limestone               |

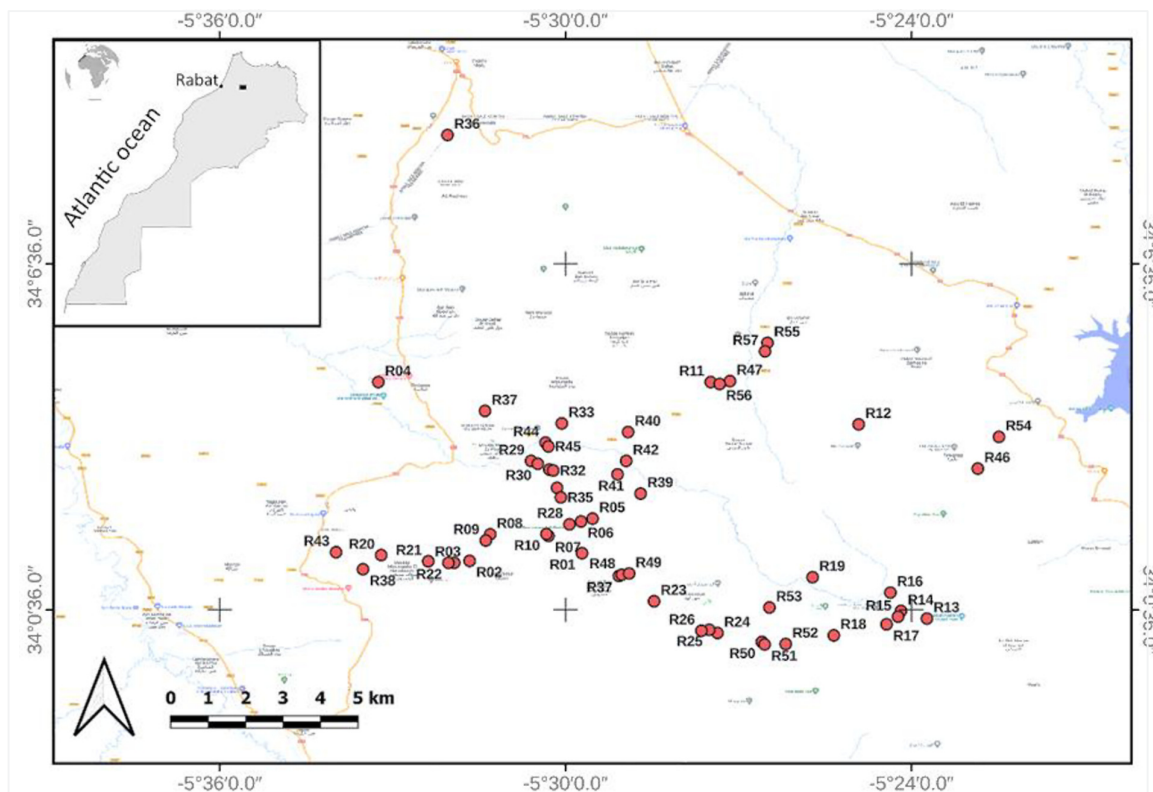


Fig. 3. Location map of 57 floristic surveys of Moulay Driss Zerhoun region (geographic coordinates for each survey are indicated in the Table 1)

## Results

### Floristic analysis

The floristic diversity of the Zerhoun massif is documented in Table 2. This list begins with Pteridophytes, then Gymnospermae, and, finally, Angiospermae. Within these groups, the systematic order of the families follows that of *Practical Vascular Flora of Morocco* (Fennane et al., 1999, 2007, 2014). Within each family, taxa are organized alphabetically. For each taxon, the accepted scientific name, life forms, and soil type in which it was found, as well as its range in Morocco's geographical divisions, are listed (Fennane et al., 1999, 2007, 2014).

A total of 407 taxa (including species and subspecies) distributed over 257 genera and 67 families were recorded in the Zerhoun Massif region (Tables 2, 3). The analysis of flora showed a comparatively higher representation of Angiospermae species (400), followed by Pteridophytes (6) and Gymnospermae (1). Of these, Asteraceae was the most speciose family (50 taxa), followed by Fabaceae (47 taxa), Poaceae

(39 taxa), Lamiaceae (25 taxa), Apiaceae (23 taxa), Caryophyllaceae (19 taxa), Rubiaceae (13 taxa), Brassicaceae (12 taxa), Geraniaceae, and Asparagaceae (10 taxa each). The least speciose families were Plantaginaceae and Boraginaceae (9 taxa each), Cistaceae and Ranunculaceae (8 taxa each), Crassulaceae and Rosaceae (7 taxa each), Asplinaeae, Gentianaceae, Hypericaceae, Linaceae, and Polygonaceae (5 taxa each), Amaryllidaceae, Orchidaceae, Oleaceae, Papaveraceae, Solanaceae, and Urticaceae (4 taxa each), Asplinaeae, Gentianaceae, Hypericaceae, Linaceae, and Polygonaceae (3 taxa each), 10 families with 2 taxa each, and a further 23 families that were each represented by one species.

Of the 257 genera identified, *Trifolium* (8 species), *Teucrium* (7 Species), *Ononis* and *Silene* (6 species each), *Asparagus*, *Eryngium*, *Erodium*, *Lotus*, *Galium*, *Geranium*, and *Filago* (5 species each), and *Cistus*, *Euphorbia*, and *Stachys* (4 species each) were the richest genera. The remaining 240 genera were represented by 1 to 3 species.



**TABLE 2. Floristic list, Life forms spectrum, assessment criteria (Fennane, 2021), rarity and endemism (Fennane and Ibn Tattou, 1998) of flora of Zerhoun massif, Morocco**

| Division, Families and Species                          | Life form spectrum | Assessment Criteria | Rarity | Endemism | Occurrence in the study area (relevés see table 2 and Fig. 3)  | Geographic distribution in Morocco      |
|---|--------------------|---------------------|--------|----------|--|---|
| <b>I-PTERIDOPHYTES</b>                                  |                    |                     |        |          |  |   |
| <b>ASPLENIACEAE</b>                                     |                    |                     |        |          |  |   |
| <i>Asplenium adiantum-nigrum</i> L.                     | G                  | LC                  |        |          | R28, R29   | AA, HA, Man                             |
| <i>Asplenium trichomanes</i> L.                         | Hem                | LC                  |        |          | R6, R10, R29, R39, R52   | HA, MA, Mam, Man, Om, LM, R             |
| <i>Asplenium Ceterach</i> L.                            | G                  | LC                  |        |          | R5, R6, R13, R14, R23, R25, R27, R28, R29, R31, R33, R39, R41, R49, R50, R51, R52  | As, AA, HA, MA, Mam, Man, Om, LM, R     |
| <b>POLYPODIACEAE</b>                                    |                    |                     |        |          |  |   |
| <i>Polypodium vulgare</i> L.                            | G                  | CR                  | RR     |          | R14, R25, R29, R31   | HA, MA, Man, LM, R                      |
| <b>PTERIDACEAE</b>                                      |                    |                     |        |          |  |   |
| <i>Pteridium aquilinum</i> (L.) Kuhn.                   | G                  | LC                  |        |          | R7, R8   | HA, MA, Man, R                          |
| <b>SELAGINELLACEAE</b>                                  |                    |                     |        |          |  |   |
| <i>Selaginella denticulata</i> (L.) Spring.             | Hem                | LC                  |        |          | R5   | HA, MA, Mam, Man, Om, LM, R             |
| <b>II-GYMNOSPERMS</b>                                   |                    |                     |        |          |  |   |
| <b>CUPRESSACEAE</b>                                     |                    |                     |        |          |  |   |
| <i>Juniperus oxycedrus</i> L.                           | Ph                 | LC                  |        |          | R25  | As, AA, HA, MA, Man, Om, LM, R          |
| <b>III-ANGIOSPERMAE, MONOCOTYLEDONAE</b>                |                    |                     |        |          |  |   |
| <b>AMARYLLIDACEAE</b>                                   |                    |                     |        |          |  |   |
| <i>Allium pallens</i> L.                                | G                  | LC                  |        |          | R44, R45, R46  | As, AA, HA, MA Mam, Man, Op, Om, LM, R. |
| <i>Allium paniculatum</i> L.                            | G                  | LC                  |        |          | R17, R18, R20, R38, R50, R57   | A, Sad, SAF, SH, H                      |
| <i>Allium subvillosum</i> Salzm. ex Schult. & Schult.f. | G                  | LC                  |        |          | R44, R11, R18  | Ms, AA, HA, MA, Mam, Man, Om, LM, R.    |
| <i>Narcissus papyraceus</i> Ker Gawl.                   | G                  | LC                  |        |          | R4   | MA, Mam, Man, LM, R.                    |
| <b>ARACEAE</b>  |                    |                     |        |          |  |   |
| <i>Arisarum vulgare</i> O. Targ. Tozz.                  | G                  | LC                  |        |          | R4, R5, R6, R7, R10, R11, R12, R13, R15, R16, R17, R19, R20, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R39 | All geographic divisions                |
| <b>ARECACEAE</b>  |                    |                     |        |          |  |   |
| <i>Chamaerops humilis</i> L.                            | Ph                 | LC                  |        |          | All relevés except (R6, R8, R12, R14)  | AA, HA, MA, Mam, Man, Om, LM, R         |

TABLE 2. Cont.

| Division, Families and Species                                    | Life form spectrum | Assessment Criteria | Rarity | Endemism | Occurrence in the study area (relevés see table 2 and Fig. 3)  | Geographic distribution in Morocco   |
|---|--------------------|---------------------|--------|----------|--|--|
| ASPARAGACEAE<br><i>Asparagus acutifolius</i> L.                   | Ph                 | LC                  |        |          | R4, R11, R16, R18, R19, R35, R47, R54  | As, AA, HA, MA, Mam, Man, Op, Om, (Bni Snassène) LM, R                       |
| <i>Asparagus albus</i> L.   | Ph                 | LC                  |        |          | R4, R11, R18, R20, R21, R23, R34, R38, R42, R55  | AA (Tazeroualt; j. Kest) HA, MA, Mam, Man, Op, Om (Bni Snassène), LM, R.     |
| <i>Asparagus altissimus</i> Munby                                 | Ph                 | LC                  |        | EA       | R25  | Western Ms, AA, HA, Mam, Man, Op, (Lower Moulouya) Om, (Bni Snassène?) LM, R |
| <i>Asparagus aphyllus</i> L.                                      | Ph                 | LC                  |        |          | R8, R36, R37, R39  | Mam (Haouz Rehamna), Man, Op, LM, West? R                                    |
| <i>Asparagus horridus</i> L.                                      | Ch                 | LC                  |        |          | R4, R5, R6, R8, R12, R36   | All geographic divisions   |
| <i>Drimys maritima</i> (L.) Stearn.                               | G                  | LC                  |        |          | R2, R3, R6, R7, R9, R10, R11, R13, R15, R16, R18, R19, R20, R21, R22, R23, R25, R27, R30, R31, R32, R35, R36, R37, RR38, R40, R41, R43, R44, R54, R55, R56 | All geographic divisions   |
| <i>Hyacinthoides lingulata</i> (Poir.) Rothm                      | G                  | LC                  |        |          | RR5, R13, R37, R42   | Mam (Chaouia- Doukkala), Man, Om (Bni Snassène), LM, R                       |
| <i>Muscari comosum</i> (L.) Mill.                                 | G                  | LC                  |        |          | R5   | As, AA, HA, MA, Mam, Man, Op, Om (Guenfouda), LM, R                          |
| <i>Ornithogalum umbellatum</i> L.                                 | G                  | NA                  | ??     |          | R4   | AA, HA, MA, Mam, Man, Op, Om, LM, R  |
| <i>Ruscus aculeatus</i> L.  | Ph                 | LC                  |        |          | R52  | As, AA, HA, MA, Mam, Man, Op?, Om, LM, R                                     |
| ASPHODELACEAE<br><i>Asphodelus ramosus</i> L.                     | G                  | LC                  |        |          | R3, R4, R11, R13, R15, R16, R17, R19, R20, R24, R25, R26, R36, R37, R38, R41, R43, R46   | All geographic divisions   |
| CYPERACEAE<br><i>Scirpoides holoschoenus</i> (L.) Soják.          | G                  | LC                  |        |          | R41  | All geographic divisions   |
| DIOSCOREACEAE<br><i>Dioscorea communis</i> (L.) Caddick & Wilkin. | G                  | LC                  |        |          | R6, R28, R39   | AA (Ifni Mountains), HA, MA, Mam, Man, Om, LM?, R                            |

TABLE 2. Cont.

| Division, Families and Species                                    | Life form spectrum | Assessment Criteria | Rarity | Endemism | Occurrence in the study area (relevés see table 2 and Fig. 3) | Geographic distribution in Morocco  |
|---|--------------------|---------------------|--------|----------|---|---|
| IRIDACEAE<br><i>Romulea columnnae</i> Sebast. & Mauri.            | G                  | LC                  | RR     |          | R30   | AA (SE of Tafraout), HA?, MA, Mam (Chaouia-Doukkala), Man, Op, Om (Bni Snassène), LM?, R                              |
| LILIACEAE<br><i>Gagea dubia</i> A. Terracc.                       | G                  | LC                  |        |          | R18   | HA, MA, Western LM?, R  |
| <i>Gagea durieui</i> Parl.  | G                  | LC                  |        | EIA      | R8  | AA, HA, MA, Mam, Man, Op, Om, LM, R   |
| ORCHIDACEAE<br><i>Neotinea conica</i> (Willd.) R.M. Bateman       | G                  | LC                  |        |          | R24, R26  | HA, MA, Mam, Man, LM, R   |
| <i>Ophrys fusca</i> subsp. <i>durieui</i> (Rchb. f.) Soó          | G                  | EN                  | RR     |          | R5  | MA (j. Rhnim), Man (Zerhou; Ain Cheggag), Om.   |
| <i>Ophrys lutea</i> Cav.  | G                  | LC                  |        |          | R28, R37  | HA, MA, Mam, Man, Om, LM, R   |
| <i>Ophrys speculum</i> Link.                                      | G                  | LC                  |        |          | R4  | HA, MA, Mam, Man, Om?, LM, R.   |
| POACEAE<br><i>Aegilops geniculata</i> Roth.                       | Th                 | LC                  |        |          | R18   | As, AA, HA, MA, Mam, Man, Op, Om, LM, R   |
| <i>Aegilops neglecta</i> Req. ex Bertol.                          | Th                 | LC                  |        |          | R24   | AA?, HA, MA, Man, Op (Taourirt), Om (Bni Snassène), LM, R   |
| <i>Aegilops triuncialis</i> L.                                    | Th                 | LC                  |        |          | R57   | AA, HA, MA, Mam, Man, Om?, LM, R  |
| <i>Aira caryophyllaea</i> L.                                      | Th                 | LC                  |        |          | R1, R17   | HA?, MA, (Tazekka) Man, LM?, R  |
| <i>Alopecurus arundinaceus</i> Poir.                              | Hem                | LC                  |        |          | R5  | AA, HA, MA, Man (Prerif-Middle Sebou), Op, Om (Debdou), LM?, R  |
| <i>Ampelodesmos mauritanicus</i> (Poir.) Durand & Schinz.         | Hem                | LC                  |        |          | R55   | MA, Man (Fez and Meknes region), Om, (Bni Snassène), LM   |
| <i>Anthoxanthum odoratum</i> L.                                   | Hem                | LC                  |        |          | R2, R11, R19, R41, R43, R56                                   | HA, (j. Gourza; j. Guerdouz; Zerektène), MA, Man (Bou-charen near Larache), Om (Debdou), R (Timeilatine; Jbel Lakraá) |
| <i>Arrhenatherum elatius</i> (L.) P. Beauv. ex J.Presl & C. Presl | Hem.               | LC                  |        |          | R17, R24, R46   | HA, MA oriental, Man (El Harcha), Op (Lower Moulouya), R  |



TABLE 2. Cont.

| Division, Families and Species                        | Life form spectrum | Assessment Criteria | Rarity | Endemism | Occurrence in the study area (relevés see table 2 and Fig. 3)      | Geographic distribution in Morocco   |
|---|--------------------|---------------------|--------|----------|--|--|
| <i>Arundo donax</i> L.                                | G                  | LC                  |        |          | R42  | All geographic divisions   |
| <i>Avena sterilis</i> L.                              | Th                 | LC                  |        |          | R4, R17, R20, R46, R50, R51  | All geographic divisions   |
| <i>Brachypodium distachyon</i> (L.) P. Beauv.         | Th                 | LC                  |        |          | R1, R3, R9, R22, R44, R45, R46, R47, R48, R50, R55, R56            | All geographic divisions   |
| <i>Briza maxima</i> L.                                | Th                 | LC                  |        |          | R10, R41, R46, R55   | HA, MA, Mam, Man, Om, LM, R  |
| <i>Briza minor</i> L.                                 | Th                 | LC                  |        |          | R7, R10  | AA, HA, MA, Mam, Man, Om, LM, R  |
| <i>Bromus hordeaceus</i> L.                           | Th                 | LC                  |        |          | R1, R3, R5, R6, R7, R8, R9, R20, R22, R23, R28, R33, R38, R43, R56 | Ms (O. Aâbar in N of Abattih on Smara-Tantan road), AA, HA, MA, Mam, Man, Op, Om, LM, R                                  |
| <i>Bromus lanceolatus</i> Roth.                       | Th                 | LC                  |        |          | R11, R17, R44, R46, R50, R55                                       | Ms (around Laâyoune and elsewhere), AA (Lakhsass Plateau), HA, MA, Mam, Man, Op, Om, LM, R                               |
| <i>Bromus madritensis</i> L.                          | Th                 | LC                  |        |          | R9, R44, R45, R46, R47, R50, R54, R55, R57                         | Ms (Assa), As, AA, HA, MA, Mam (W of Chichaoua; Amsittène), Op, (Oulad Settout, Moulouya alluvium), Om, (Jerada)?, LM, R |
| <i>Bromus rubens</i> L.                               | Th                 | LC                  |        |          | R17, R24, R50, R56   | All geographic divisions   |
| <i>Catapodium rigidum</i> (L.) C. E. Hubb.            | Th                 | LC                  |        |          | R7, R43, R54   | AA, HA, MA, Mam, Man, Op, Om, LM, R  |
| <i>Corynephorus divaricatus</i> (Pourr) Breistr.      | Th.                | LC                  |        |          | R55  | MA, Man, Om, LM, R   |
| <i>Cynosurus echinatus</i> L.                         | Th                 | LC                  |        |          | R6, R7, R10, R13, R24, R28, R39, R41, R44, R46, R52, R53           | MA, Man, Om (Bni Snassène), LM, R  |
| <i>Dactylis glomerata</i> L.                          | Th                 | LC                  |        |          | R4, R11, R17, R18, R23, R24, R38, R43, R44, R46, R50, R53          | As, AA, HA, MA, Mam, Man, Op, Om, LM, R  |
| <i>Festuca ambigua</i> Le Gall                        | Th                 | LC                  |        |          | R24, R57   | AA, HA, MA, Mam (Haouz-Rehamna), Man, Op, Om, LM, R  |
| <i>Festuca geniculata</i> (L.) Lag. & Rodr.           | Th                 | LC                  |        |          | R20, R39   | As, AA, HA, MA, Mam, Man, Op, Om, LM, R  |
| <i>Gastridium ventricosum</i> (Gouan) Schinz & Thell. | Th                 | LC                  |        |          | R19, R43   | Ms (O. Noun to Sidi Aroussi, 20 km W of Abouda), AA, HA, MA, Mam, Man, Om, LM, R   |
| <i>Gaudinia fragilis</i> (L.) P. Beauv.               | Th                 | LC                  |        |          | R24, R41   | AA, HA, MA, Mam, Man, Om, LM, R  |

TABLE 2. Cont.

| Division, Families and Species                      | Life form spectrum | Assessment Criteria | Rarity | Endemism | Occurrence in the study area (relevés see table 2 and Fig. 3)   | Geographic distribution in Morocco  |
|---|--------------------|---------------------|--------|----------|---|---|
| <i>Hordeum murinum</i> L.                           | Th                 | LC                  |        |          | R21   | All geographic divisions  |
| <i>Hypparrhenia hirta</i> Stapf.                    | Hem                | LC                  |        |          | R2, R3, R9, R17, R19, R20, R21, R22, R23, R35, R37, R38, R43, R47, R56  | Ms (lower valley of the western Draâ)?, MA (around Taza, 930 m), Mam (Marrakech)?, Man, LM, R |
| <i>Lagurus ovatus</i> L.                            | Th                 | LC                  |        |          | R5, R39, R46, R55, R57  | All geographic divisions  |
| <i>Lamarckia aurea</i> Moench.                      | Th                 | LC                  |        |          | R43, R50  | All geographic divisions  |
| <i>Lolium rigidum</i> Gaudin.                       | Th                 | LC                  |        |          | R11   | All geographic divisions  |
| <i>Melica ciliata</i> L.                            | Hem                | LC                  |        |          | R11, R17, R47, R50, R51, R53, R54   | AA, HA, MA, Mam, Man, Op, Om, LM, R   |
| <i>Melica minuta</i> L.                             | Hem                | LC                  |        |          | R1, R3, R6, R19, R22, R23, R27, R38, R39, R41, R43, R44, R47, R49, R50, R56   | HA, MA, Man, Op, Om, LM, R  |
| <i>Oloptum milicaceum</i> (L.) Röser & Hamasha      | Hem                | LC                  |        |          | R5, R9, R17, R23, R29, R39, R40, R47  | All geographic divisions  |
| <i>Patzkea coerulescens</i> (Desf.) H.Scholz        | Hem.               | LC                  |        |          | R13, R27  | AA, HA, MA, Mam, Man, Om, (Bni Snassène), LM, R   |
| <i>Pipatherum caerulescens</i> (Desf.) Beauv        | Hem                | LC                  |        |          | R1, R6, R31, R32, R34, R35, R54   | All geographic divisions  |
| <i>Poa annua</i> L.                                 | Th.                | LC                  |        |          | R36   | Non-Saharan Morocco   |
| <i>Poa bulbosa</i> L.                               | Hem                | LC                  |        |          | R36, R37  | As, AA, HA, MA, Mam, Man, Op, Om, LM, R   |
| <i>Polygomon monspeliensis</i> (L.) Desf.           | Th                 | LC                  |        |          | R57   | All geographic divisions  |
| <i>Stipellula capensis</i> (Thunb.) Röser & Hamasha | Th                 | LC                  |        |          | R3, R17, R20, R22, R27, R38, R40, R43, R47, R50, R55  | All geographic divisions  |
| SMILACEAE   |                    |                     |        |          |   |   |
| <i>Smitax aspera</i> L.                             | Ph                 | LC                  |        |          | R1, R3, R5, R6, R7, R8, R9, R10, R11, R12, R16, R17, R18, R19, R23, R24, R27, R28, R29, R34, R35, R37, R38, R39, R40, R42, R47, R49, R53, R54, R55, R57 | As, AA, HA, MA, Mam, Man, Om, LM, R   |
| IV-ANGIOSPERMAE, DICOTYLEDONAE                      |                    |                     |        |          |   |   |
| ACANTHACEAE   |                    |                     |        |          |   |   |
| <i>Acanthus mollis</i> L.                           | Hem                | LC                  |        |          | R29, R39  | MA, Man, Om, LM, R  |
| ADOXACEAE   |                    |                     |        |          |   |   |
| <i>Viburnum tinus</i> L.                            | Ph                 | LC                  |        |          | R5, R6, R7, R8, R9, R10, R23, R28, R29, R39   | HA, MA, Man, Om (Bni Snassène), LM, R   |

TABLE 2. Cont.

| Division, Families and Species                            | Life form spectrum | Assessment Criteria | Rarity | Endemism | Occurrence in the study area (relevés see table 2 and Fig. 3)                  | Geographic distribution in Morocco   |
|---|--------------------|---------------------|--------|----------|--|--|
| AMARANTHACEAE<br><i>Beta vulgaris</i> L.                  | Th                 | LC                  |        |          | R39  | All geographic divisions except Saharan regions  |
| ANACARDIACEAE<br><i>Pistacia atlantica</i> Desf.          | Ph                 | LC                  |        |          | R54  | All geographic divisions   |
| <i>Pistacia lentiscus</i> L.                              | Ph                 | LC                  |        |          | All relevés except: R13, R14, R15, R16, R17, R24, R25, R26, R34, R36, R51, R52 | As, AA, HA, MA, Mam, Man, Om, LM, R  |
| <i>Pistacia saportae</i> Burmat.                          | Ph                 | NA                  |        |          | R3   | MA (gorges around Taza; Atchana on the E side of Guelb Errahal), Rif (gorges around Boured)  |
| <i>Pistacia terebinthus</i> L.                            | Ph                 | LC                  |        |          | R1, R10, R19, R20, R23, R27, R34, R35, R37, R39, R44, R46, R48, R49, R52, R53  | All geographic divisions   |
| <i>Searsia pentaphylla</i> (Jacq.) F.A.Barkley ex Moffett | Ph                 | LC                  |        |          | R43  | All geographic divisions   |
| APIACEAE<br><i>Ammi majus</i> L.                          | Th                 | LC                  |        |          | R4, R11  | AA, HA, MA, Mam, Man, Op, Om, LM, R  |
| <i>Ammoides pusilla</i> (Brot.) Breistr.                  | Th                 | LC                  |        |          | R12, R40, R41, R42, R43, R44, R45, R46, R47, R50                               | MA, Mam, Man, Op (between Mezguitem and Saka), Om (Bni Snassène), LM, R  |
| <i>Anthriscus caucalis</i> . M. Bieb.                     | Th                 | LC                  |        |          | R12, R18   | As (Jbel Bni Smir), HA (Tizi-n-Iguer oak grove; Tizi-n'Ighrem), MA (Bab Metik; Kerrouchen), Mam (Moulay Bou Azza), Man (Taza; El Harcha), Om (Bni Snassène), LM (Bokkoya; Nekkot), R |
| <i>Athamanta sicula</i> L.                                | Hem                | LC                  |        |          | R14, R29, R39, R51, R52  | Oceanic Ms, AA, HA, MA, Mam, Man, Op, Om, LM, R  |
| <i>Bunium atlanticum</i> (Maire) Dobignard.               | G                  | LC                  |        |          | R41  | AA (j. Aklim; j. Imquend), HA, MA, LM (Bokkoya), R   |
| <i>Conopodium majus</i> (Gouan) Loret.                    | G                  | NA                  | RR     |          | R24  | AA, MA, Mam, Man, Op, Om, LM, R  |
| <i>Daucus crinitus</i> Desf.                              | G.                 | LC                  |        |          | R4   | AA, Western HA, MA, Mam, Man, Om, LM, R  |

TABLE 2. Cont.

| Division, Families and Species                                   | Life form spectrum | Assessment Criteria | Rarity | Endemism | Occurrence in the study area (relevés see table 2 and Fig. 3)  | Geographic distribution in Morocco   |
|--|--------------------|---------------------|--------|----------|--|--|
| <i>Eryngium campestre</i> L.                                     | Hem                | LC                  |        |          | R2, R15, R17, R20, R24, R34, R38, R43, R50, R51, R54, R55  | HA, MA central, Mam, Man (Prerif) Om (Bni Snassène), LM, R   |
| <i>Eryngium maritimum</i> L.                                     | G                  | LC                  |        |          | R11, R14, R17, R21, R44  | Mam, Man, LM, R  |
| <i>Eryngium ilicifolium</i> Lam.                                 | Th                 | LC                  |        |          | R11  | HA, MA central, Mam, Man (Prerif) Om, (Bni Snassène) LM, R   |
| <i>Eryngium tricuspdatum</i> L.                                  | Hem                | LC                  |        |          | R4, R5, R7, R9, R10, R13, R15, R17, R18, R19, R20, R24, R25, R26, R28, R32, R34, R37, R38, R40, R44, R45, R46, R50 | Ms, AA, HA, MA, Mam, Man, Om, LM, R  |
| <i>Eryngium triquetrum</i> Vahl.                                 | Hem                | LC                  |        |          | R20  | HA, MA, Mam, Man, Op, Om, LM, R  |
| <i>Ferula communis</i> L.  | G                  | LC                  |        |          | R29, R38, R39  | All geographic divisions   |
| <i>Kundmannia sicula</i> (L.) DC.                                | G                  | LC                  |        |          | R6, R10, R18, R28, R37, R52  | AA, HA, MA, Mam, Man, Op, Om, LM, R  |
| <i>Modesciadium involucreatum</i> (Maire) P.Vargas & Jim. Mejias | Th                 | LC                  |        | E        | R51  | Ms, AA, HA, Mam, Man (Khorifla valley; Zaïane)   |
| <i>Scandix pecten-veneris</i> L.                                 | Th                 | LC                  |        |          | R10, R16, R24, R25, R26  | All geographic divisions except Ms   |
| <i>Snyrrinium olusatrum</i> L.                                   | G                  | LC                  |        |          | R16  | HA, MA, Mam, Man, Op, Om, LM, R  |
| <i>Stoibrax dichotomum</i> (L.) Raf.                             | Th                 | LC                  |        |          | R54  | AA, HA, MA, Mam, Man, Op, Om, LM, R  |
| <i>Thapsia foetida</i> L.  | G                  | LC                  |        |          | R9, R24  | AA, HA, MA, Mam, Man, R  |
| <i>Thapsia garganica</i> L.                                      | G                  | NA                  |        |          | R4, R20  | Ms?, HA, MA, Mam, Man Op Om LM R.  |
| <i>Thapsia meoides</i> (Desf.) Guss.                             | G                  | LC                  | R?     |          | R5, R11, R14, R19, R25, R26, R36, R37, R43, R45, R46   | AA (Ifni mounts), HA (j. Ouaskal; Isk Rached), MA (Bab Azhar; between Ouaouzaght and Taguelft), Mam (Souss; Derouate; Jbilète) |
| <i>Torilis arvensis</i> (Huds.) Link.                            | Th                 | LC                  |        |          | R1, R8, R10, R23, R24, R28, R46, R50, R51, R54   | HA, MA, Mam, Man, Op, Om, LM, R  |
| <i>Torilis nodosa</i> (L.) Gaertn.                               | Th                 | LC                  |        |          | R24, R34, R36, R43   | All geographical divisions of Morocco  |
| APOCYANACEAE   |                    |                     |        |          |  |  |
| <i>Nerium oleander</i> L.  | Ph                 | LC                  |        |          | R42  | All geographic divisions   |
| ARISTOLOCHIACEAE   |                    |                     |        |          |  |  |
| <i>Aristolochia baetica</i> L.                                   | Ph                 | LC                  |        |          | R40, R43, R44  | AA, HA, Mam, Man, Om, LM, R  |
| <i>Aristolochia paucinervis</i> Pomet.                           | G                  | LC                  |        |          | R12, R24, R25, R48   | AA, MA, Mam, Man, Om, LM, R  |

TABLE 2. Cont.

| Division, Families and Species            | Life form spectrum | Assessment Criteria | Rarity | Endemism | Occurrence in the study area (relevés see table 2 and Fig. 3)                                  | Geographic distribution in Morocco                                    |
|---|--------------------|---------------------|--------|----------|--|---|
| ASTERACEAE                                |                    |                     |        |          |  |   |
| <i>Andryala integrifolia</i> L.           | Th                 | LC                  |        |          | R5, R9, R18, R19, R41, R46   | AA, HA, MA, Mam, Man, Op, LM, R                                       |
| <i>Andryala rothia</i> Pers.              | Th                 | LC                  |        |          | R38, R50   | AA, MA, Mam, Man, Op, LM?, R  |
| <i>Asteriscus aquaticus</i> (L.) less.    | Th                 | LC                  |        |          | R44, R46, R55  | HA, MA, Mam, Man, Op (lower Moulouya) Om, LM, R                       |
| <i>Atractylis cancellata</i> L.           | Th                 | LC                  |        |          | R1, R2, R9, R24, R27, R37, R38, R40, R48   | All geographic divisions  |
| <i>Bellis annua</i> L.                    | Th                 | LC                  |        |          | R5, R33, R39   | HA, MA, Mam, Man, Op, Om, LM, R                                       |
| <i>Bellis syvestris</i> Cirillo.          | Hem                | LC                  |        |          | R11, R13, R24  | AA, HA, MA, Mam, Man, Op, (Lower Moulouya), Om, LM, R                 |
| <i>Calendula arvensis</i> L.              | Th                 | LC                  |        |          | R2, R4, R36  | All geographic divisions  |
| <i>Calendula meuselii</i> Ohle.           | Ch                 | CR                  | E      |          | R49, R53   | Man (Zerhoun massif: j. El-Rherraif near Sidi Kdat; j. Takerma)       |
| <i>Calendula stellata</i> Cav.            | Th                 | LC                  | R?     |          | R18  | All geographic divisions (except Non-Saharan Morocco)                 |
| <i>Carduus myriacanthus</i> Salzm. ex DC. | Th                 | LC                  |        |          | R6   | Mam, Man, LM, R   |
| <i>Carduus pycnocephalus</i> L.           | Hem                | LC                  |        |          | R43, R50   | AA, HA, MA, Mam, Man, Op, Om, LM, R                                   |
| <i>Carlina hispanica</i> Lam.             | Hem                | LC                  |        |          | R1, R2, R3, R4, R11, R12, R17, R18, R19, R21, R23, R24, R26, R37, R43, R44, R45, R46, R47, R50 | HA (Ayachi), MA, Mam, Man, Op, Om, LM, R                              |
| <i>Carlina racemosa</i> L.                | Th                 | LC                  |        |          | R4, R9, R17, R19, R21, R36, R38, R50   | HA, MA, Mam, Man, Op, LM, R   |
| <i>Carthamus lanatus</i> L.               | Th                 | LC                  |        |          | R11, R17, R50, R56   | As, AA, HA, MA, Mam, Man, Op, Om, LM, R                               |
| <i>Catananche caerulea</i> L.             | G                  | LC                  |        |          | R56  | As, AA, HA, MA, Man, Op, LM, R  |
| <i>Centaurea melitensis</i> L.            | Th                 | LC                  |        |          | R1, R3, R21, R22, R50, R55   | Circummed. Ms Oriental, As, AA, HA, MA, Mam, Man, Op, Om, LM, R.      |
| <i>Centaurea pullata</i> L.               | Hem                | LC                  |        |          | R2, R4, R18, R19, R24, R37   | AA, HA, MA, Mam, Man, Op, Om, LM, R                                   |
| <i>Centaurea sulphurea</i> Willd.         | Th                 | LC                  |        |          | R1, R2, R3, R5, R9, R11, R18, R19, R22, R23, R43, R46, R47, R50, R56                           | AA (Ifni Mountains), HA, MA, Mam, Man, Op (Lower Moulouya), Om, LM, R |
| <i>Cichorium intybus</i> L.               | Hem                | LC                  |        |          | R4, R17, R24, R50  | HA, MA, Mam, Op, Om, LM, R  |

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|---|--------------------|---------------------|--------|----------|---|--|
| <i>Cirsium ducellieri</i> Maire.                    | Hem                | CR                  | RR     | E        | R43   | MA (Bekrit; Senoual valley to Aghbalou Bou- Ichatefel), Man, (Prerif)                              |
| <i>Cladanthus mixtus</i> (L.) Chevall.              | Th                 | LC                  |        |          | R1, R9, R12   | HA, MA, Mam, Man, Op, Om, LM, R  |
| <i>Crepis vesicaria</i> L.                          | Hem                | LC                  |        |          | R11, R36, R46   | Non-Saharan Morocco  |
| <i>Cynara humilis</i> L.                            | G                  | LC                  |        | E IAC?   | R9, R11, R17, R24   | HA, MA, Mam, Man, LM western, R  |
| <i>Ditrichia viscosa</i> (L.) Greuter.              | Ch                 | LC                  |        |          | R42   | All geographic divisions (except Non-Saharan Morocco)  |
| <i>Filago duriaei</i> Coss. ex Lange                | Th                 | LC                  | R      | E IA     | R55   | MA (El-Hajeb ; Tazekka), Mam (Haouz-Rehanna), Man, Op (Lower Moulouya), Om (Bni Snaassène), LM, R? |
| <i>Filago germanica</i> L.                          | Th                 | LC                  |        |          | R2, R3, R21, R23, R25, R27, R34, R37, R38, R40, R41               | HA, MA, Mam, Man, Op, Om, LM, R  |
| <i>Filago pygmaea</i> (L.) Brot.                    | Th                 | LC                  |        |          | R15, R24, R25, R33, R36, R38                                      | AA, HA, MA, Mam, Man, Op?, Om, LM, R   |
| <i>Filago pyramidata</i> L.                         | Th                 | LC                  |        |          | R1, R5, R9, R10, R11, R17, R24, R37, R43, R44, R46, R47, R48, R50 | Ms, AA, HA, MA, Mam, Man, Op, Om, LM, R  |
| <i>Hedypnois rhagadioloides</i> (L.) F. W. Schmidt. | Th                 | LC                  |        |          | R38, R39  | All geographic divisions   |
| <i>Hyoseris radiata</i> L.                          | Hem                | LC                  |        |          | R11, R13, R14, R24, R25, R29, R39, R46, R51, R52, R53             | All geographic divisions (except Non-Saharan Morocco)  |
| <i>Hypochaeris achyrophorus</i> L.                  | Th                 | LC                  |        |          | R51   | HA, MA, Mam, Man, Op, Om, LM, R  |
| <i>Lactuca serriola</i> L.                          | Th                 | LC                  |        |          | R17   | Ms (Rissani), HA, MA, Mam, Man, Op, Om, LM, R  |
| <i>Leontodon saxatilis</i> Lam.                     | Th                 | LC                  |        |          | R11, R36, R43, R50  | AA Western, HA, MA, Mam, Man, Op, Om, LM, R  |
| <i>Logfia gallica</i> (L.) Coss. & Germ             | Th                 | LC                  |        |          | R7, R9, R20, R21, R23, R24, R27, R38, R47                         | AA, HA, MA, Mam, Man, Op (lower Moulouya), Om, LM, R   |
| <i>Notobasis syriaca</i> (L.) Cass.                 | Th                 | LC                  |        |          | R19   | MA, Mam, Man, Op (lower Moulouya), Om, LM, R   |



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| Division, Families and Species                                  | Life form spectrum | Assessment Criteria | Rarity | Endemism | Occurrence in the study area (relevés see table 2 and Fig. 3)  | Geographic distribution in Morocco  |
|---|--------------------|---------------------|--------|----------|--|---|
| <i>Pallenis spinosa</i> (L.) Cass.                              | Hem                | LC                  |        |          | R1, R2, R3, R9, R11, R17, R18, R19, R22, R23, R24, R27, R37, R38, R40, 43, R50, R56  | All geographic divisions  |
| <i>Phagnalon rupestre</i> (L.) DC.                              | Ch                 | LC                  |        |          | R1, R3, R21, R22, R39, R53   | Oceanic Ms (Hassi Zehar, ...?),<br>HA, MA, Mam, Man, Op (lower Moulouya), Om, LM, R |
| <i>Phagnalon saxatile</i> (L.) Cass.                            | Ch                 | LC                  |        |          | R1, R3, R4, R5, R6, R8, R9, R10, R16, R17, R18, R19, R20, R21, R22, R23, R25, R27, R28, R29, R37, R38, R40, R41, R43, R44, R45, R46, R47, R48, R49, R50, R54 | Oceanic Ms, (NE of Tan-Tan; SW of Ait Jerrar), AA, HA, MA, Mam, Man, Op, Om, LM, R  |
| <i>Picnoman acarna</i> (L.) Cass.                               | Th.                | LC                  |        |          | R11  | HA, MA, Man (Prefecture- Middle Sebou), Om, LM, R                                   |
| <i>Pulicaria odora</i> (L.) Rchb.                               | Hem                | LC                  |        |          | R46  | HA, MA, Mam, Man, Om, LM, R   |
| <i>Pulicaria palmidosa</i> Link                                 | Th                 | LC                  | E1     |          | R54  | Ms, AA, HA, MA, Mam, Man, LM, R   |
| <i>Pulicaria odora</i> (L.) Rchb.                               | Hem                | LC                  |        |          | R46  | HA, MA, Mam, Man, Om, LM, R   |
| <i>Scolymus hispanicus</i> L.                                   | Hem                | LC                  |        |          | R4, R11, R15, R17, R18, R26, R37   | Ms (Rissani), AA, HA, MA, Mam, Man, Op, Om, LM, R                                   |
| <i>Scorzoneroideis muelleri</i> (Sch. Bip.) Greuter & Talavera. | Th                 | LC                  |        |          | R38  | Ms, As, AA, Western HA, MA, Mam, Op, LM, R  |
| <i>Senecio vulgaris</i> L.                                      | Th                 | LC                  |        |          | R11, R16, R33  | AA, HA, MA, Mam, Man, Op, Om, LM, R   |
| <i>Sonchus oleraceus</i> L.                                     | Th                 | LC                  |        |          | R39, R46, R50, R53   | All geographic divisions  |
| <i>Sonchus tenerrimus</i> L.                                    | Th                 | LC                  |        |          | R17  | All geographic divisions  |
| <i>Tolpis barbata</i> (L.) Gaertn.                              | Th                 | LC                  |        |          | R20  | Man, Op, Om, LM, R  |
| <i>Tragopogon dubius</i> Scop.                                  | Th                 | NA                  |        |          | R17  | Om (Bni Snassène; j. Farouane), R (Bni Hosmar?; region of Aknoul?) (n.v).           |
| <i>Urospermum dalechampii</i> (L.) Scop. ex F.W.Schmidt.        | Hem                | LC                  |        |          | R4   | Circummed HA, MA, Mam (Chaouia-Doukkala), Man, Op, Om, LM, R                        |
| <i>Urospermum picroides</i> (L.) Scop. ex F.W.Schmidt.          | Th                 | LC                  |        |          | R10, R11, R17, R19, R24, R27, R28, R38, R40  | All geographic divisions  |
| BORAGINACEAE  |                    |                     |        |          |  |   |
| <i>Borago officinalis</i> L.                                    | Th                 | LC                  |        |          | R4   | AA, HA, MA, Mam (Chaouia-Doukkala), Man, Op, Om, LM, R                              |

TABLE 2. Cont.

| Division, Families and Species                                | Life form spectrum | Assessment Criteria | Rarity | Endemism | Occurrence in the study area (relevés see table 2 and Fig. 3) | Geographic distribution in Morocco   |
|---|--------------------|---------------------|--------|----------|---|--|
| <i>Buglossoides arvensis</i> (L.) I.M. Johnst.                | Th                 | LC                  |        |          | R9  | All geographic divisions except Ms.  |
| <i>Cynoglossum clandestinum</i> Desf.                         | Th                 | LC                  |        |          | R4, R5, R37, R38  | Ms (Guelmim), AA, HA, MA central (around Itto), Mam, Man, Op, Om, LM, R                      |
| <i>Cynoglossum creticum</i> Mill.                             | Th                 | LC                  |        |          | R39   | All geographic divisions   |
| <i>Echium creticum</i> L. subsp. <i>Creticum</i>              | Th                 | NA                  |        |          | R2  | Non-Saharan Morocco  |
| <i>Echium sabulicola</i> Pomel.                               | Hem                | LC                  |        |          | R47   | AA, HA, Mam, Man, Op, Om (Bni Snassène), LM, R   |
| <i>Lithodora fruticosa</i> (L.) Griseb.                       | Ch                 | VU                  | R      |          | R11   | MA (j. Lahmar; j. Ouarit), Op?, LM   |
| <i>Neotostema apulum</i> (L.) I.M. Johnst.                    | Th                 | LC                  |        |          | R5, R20   | AA, HA, MA, Mam, Man, Op, Om, LM, R  |
| <i>Paradoglossum cheirifolium</i> (L.) E.Barbier & Mathez     | Th                 | LC                  |        |          | R46   | All geographic divisions   |
| <b>BRASSICACEAE</b>   |                    |                     |        |          |   |  |
| <i>Alyssum alyssoides</i> (L.) L.                             | Th                 | LC                  | R      |          | R4, R11, R24, R26, R34, R36, R43                              | HA (J. Maâsker, 2800 m), MA (Ifrane; Aguelmame Sidi Ali), Op (east of Midelt), R (J. Lakráa) |
| <i>Alyssum simplex</i> Rudolphi.                              | Th                 | LC                  |        |          | R40, R47, R53, R56, R57                                       | Everywhere except Ms   |
| <i>Arabis hirsuta</i> (L.) Scop.                              | Hem                | NA                  | RR     |          | R6  | MA (Bou-Iblane, Meskdal about 2200 m); (n.v.)  |
| <i>Biscutella auriculata</i> L.                               | Th                 | LC                  |        |          | R51   | Man, Op (Lower Moulouya)?, LM, R   |
| <i>Biscutella didyma</i> L.                                   | Th                 | LC                  |        |          | R2, R4, R17, R19, R37, R40, R43, R44, R47, R50, R55, R57      | All geographic divisions   |
| <i>Biscutella pseudohyrata</i> Vicente, Alonso & Crespo       | Th                 | IN                  | E      |          | R51   | Man (between Rabat and Larache)  |
| <i>Ceratocnemum aphanoneurum</i> (Maire & Weiller) Al-Shehbaz | Th                 | VU                  | E      |          | R4  | Mam, Man   |
| <i>Diploptaxis tenuifolia</i> (L.) DC.                        | Hem                | NA                  | RR     |          | R4  | R(Tangier); to be sought; (n.v.)   |

TABLE 2. Cont.

| Division, Families and Species                | Life form spectrum | Assessment Criteria | Rarity | Endemism | Occurrence in the study area (relevés see table 2 and Fig. 3) | Geographic distribution in Morocco  |
|---|--------------------|---------------------|--------|----------|---|---|
| <i>Diplotaxis tenuisiliqua</i> Delile.        | Th                 | LC                  |        | EA       | R20   | AA, HA, Mam, Man, Op, Om, LM, R   |
| <i>Lobularia libyca</i> (Viv.) Meisn.         | Th                 | LC                  |        |          | R47   | Ms, AA, Mam, Man, Op, R   |
| <i>Lobularia maritima</i> (L.) Desv.          | Ch                 | LC                  |        |          | R29, R30, R31, R32, R33, R34, R35, R39, R48, R49              | AA, HA, MA, Mam, Man, Op, Om, LM, R   |
| <i>Nocca perfoliata</i> (L.) Al-Shehbaz       | Th                 | LC                  |        |          | R14   | All geographic divisions except Ms and Op   |
| CAMPANULACEAE                                 |                    |                     |        |          |   |   |
| <i>Campanula dichotoma</i> L.                 | Th                 | LC                  |        |          | R4, R18, R19, R23, R27, R38, R40, R43, R44, R48, R51          | All geographic divisions  |
| <i>Campanula lusitanica</i> L.                | Th                 | LC                  |        | EI       | R5, R6, R24, R28, R39, R41, R46, R49, R52                     | AA, HA, MA, Mam, Man, Op, LM, R   |
| <i>Campanula rapunculus</i> L.                | Hem                | LC                  |        |          | R5, R18, R19, R37, R42, R44, R46                              | Western AA, HA, MA, Mam, Man, Op, LM, R   |
| <i>Feeria angustifolia</i> (Schousb.) Buser   | Ch                 | LC                  |        | E        | R27, R39, R49, R52, R53                                       | HA, MA, Mam, Man, Op (lower Moulouya), R  |
| <i>Jasione montana</i> L.                     | Hem                | LC                  |        |          | R17, R19, R51   | AA, HA, MA, Mam, Man, Op (Bni Snassène), LM, R  |
| CAPPARACEAE                                   |                    |                     |        |          |   |   |
| <i>Capparis spinosa</i> L.                    | Ch                 | NA                  |        |          | R49   | Spontaneous throughout Morocco; widely cultivated in the regions of Fez, Meknes and Marrakech |
| CAPRIFOLIACEAE                                |                    |                     |        |          |   |   |
| <i>Lonicera implexa</i> Sol.                  | Ph                 | LC                  |        |          | R1, R3, R5, R6, R7, R8, R10, R22, R23, R28, R48               | As, AA, Western HA, MA, Mam, Man, Op, LM, R   |
| <i>Scabiosa atropurpurea</i> L.               | Hem                | LC                  |        |          | R1, R2, R3, R5, R6, R9, R11, R21, R22, R23, R27, R38, R45     | HA, MA, Mam, Man, Op, LM, R   |
| <i>Valeriana calcitrapae</i> L.               | Th                 | LC                  |        |          | R1  | AA, HA, MA, Mam, Man, Op (Bni Snassène), LM, R  |
| <i>Valeriana cornucopitiae</i> L.             | Th                 | LC                  |        |          | R11   | MA (Tazekka), Mam (Chaouia-Doukkala; Mouyen Oum-Rbiâ), Western Man, LM, R                     |
| <i>Valeriana macrosiphon</i> (Boiss.) E.Vilm. | Th                 | LC                  |        | EIA      | R39   | HA?, MA, Man, Op (Bni Snassène), LM, R  |

TABLE 2. Cont.

| Division, Families and Species   | Life form spectrum | Assessment Criteria | Rarity | Endemism | Occurrence in the study area (relevés see table 2 and Fig. 3)                     | Geographic distribution in Morocco   |
|--|--------------------|---------------------|--------|----------|---|--|
| <b>CARYOPHYLLACEAE</b>   |                    |                     |        |          |   |  |
| <i>Arenaria serpyllifolia</i> subsp. <i>leptoclados</i> (Rehb.) Nyman              | Th                 | LC                  |        |          | R38   | As, AA, HA, MA Mam, Man, Op, Om (Zegzel Valley), LM (Melilia), R   |
| <i>Cerastium glomeratum</i> Thuill.  | Th                 | LC                  |        |          | R7, R10, R12  | All geographic divisions except Ms.  |
| <i>Dianthus lusitanus</i> Brot.  | Ch                 | LC                  |        | EIA      | R2, R37, R39  | As, AA, HA, MA, Mam, Man, R (Bni Hosmar; Ketama)   |
| <i>Dianthus nudiflorus</i> Griff.  | Th                 | LC                  |        |          | R24, R38, R40, R43, R44, R46  | As, AA (Tafraoute), HA, MA, Man, Om, R   |
| <i>Dianthus sylvestris</i> subsp. <i>Longibracteatus</i> (Maire) Greuter & Burdet. | Hem                | LC                  | R      | E        | R52, R56  | MA (Jaâba forest), Mam (between Jorf-el-Yhoudi and Tnine Rhiate), Man (mouth of the Sebou, J. Zerhoun), LM (Melilia, j. Gourougou) |
| <i>Gypsophila vaccaria</i> (L.) Sm.  | Th                 | LC                  |        |          | R37   | All geographic divisions   |
| <i>Herniaria hirsuta</i> L.  | Th                 | LC                  | R      |          | R43, R47  | Mam (Safi), Man (Larache; Mehdia), LM (Melilia), R (Tetouan; Tangier)  |
| <i>Paronychia argentea</i> Lam.  | Hem                | LC                  |        |          | R4, R5, R11, R17, R23, R24, R25, R26, R34, R36, R38, R40, R41, R47, R50, R55, R57 | Ms, AA, HA, MA, Mam, Man, Op, R  |
| <i>Paronychia capitata</i> (L.) Lam. subsp. <i>capitata</i> .                      | Hem                | LC                  |        |          | R1, R18, R20, R21, R38, R53, R57  | All geographic divisions except Ms   |
| <i>Paronychia chlorothyrsa</i> Murb.   | Hem                | LC                  |        |          | R3, R4, R22, R38).  | All geographic divisions   |
| <i>Paronychia echimulata</i> Chater.   | Th.                | LC                  |        |          | R5, R6, R9, R27, R40, R43, R46, R47, R48  | HA (Mgouna; Iouaridène), MA, Mam (Khénifra), Man, LM (Melilia), R  |
| <i>Polycarpon tetraphyllum</i> (L.) L.   | Th                 | LC                  |        |          | R4, R7, R24, R38, R39, R43, R50   | Ms, AA, HA, MA, Mam, Man, Om, LM, R  |
| <i>Silene apetala</i> Willd.   | Th                 | LC                  |        |          | R23, R45  | AA, HA, Mam, Man, Op, Om, R  |
| <i>Silene colorata</i> Poir.   | Th                 | LC                  |        |          | R4  | All geographic divisions except Ms and As  |
| <i>Silene gallica</i> L.   | Th                 | LC                  |        |          | R5, R47   | All geographic divisions except Ms and As  |
| <i>Silene latifolia</i> Poir.  | Hem                | LC                  |        |          | R52   | HA, MA?, Mam, Man, Om, LM, R   |
| <i>Silene nocturna</i> L.  | Th                 | LC                  |        |          | R55, R56, R57   | All geographic divisions except As?  |

TABLE 2. Cont.

| Division, Families and Species   | Life form spectrum | Assessment Criteria | Rarity | Endemism | Occurrence in the study area (relevés see table 2 and Fig. 3)   | Geographic distribution in Morocco                        |
|--|--------------------|---------------------|--------|----------|---|---|
| <i>Silene vulgaris</i> (Moench) Gareke.                                    | G                  | LC                  |        |          | R5, R10, R37  | All geographic divisions                                  |
| <i>Stellaria media</i> (L.) Vill.  | Th                 | LC                  |        |          | R39   | All geographic divisions except Ms                        |
| CISTACEAE  |                    |                     |        |          |   |   |
| <i>Cistus albidus</i> L.   | Ph                 | LC                  |        |          | All relevés except: R4, R12-R17, R26, R29, R36, R37, R39, R51, R51, R52.  | Mam, Man, Om, LM, R                                       |
| <i>Cistus creticus</i> L.  | Ch                 | LC                  |        |          | R21   | All geographic divisions except Ms                        |
| <i>Cistus monspeliensis</i> L.   | Ph                 | LC                  |        |          | R57   | HA, MA, Mam, Man, Om, LM, R                               |
| <i>Cistus saviiifolius</i> L.  | Ch                 | LC                  |        |          | R1, R2, R3, R5, R6, R7, R8, R9, R10, R12, R14, R19, R20, R21, R22, R23, R24, R27, R28, R30, R31, R32, R38, R41, R44, R45, R46, R47, R48, R53, R55, R57. | AA, HA, MA, Mam, Man, Om, LM, R                           |
| <i>Fumana fontanessii</i> Pomel.   | Ph                 | LC                  |        |          | R2, R9, R21, R22, R23, R24, R38   | HA, MA, Mam, Man, R                                       |
| <i>Fumana thymifolia</i> (L.) Spach ex Webb.                               | Ch                 | LC                  |        |          | R2, R3, R21, R22, R23, R27, R37, R38, R48, R53  | AA, HA, MA, Mam, Man, Op, Om, LM, R                       |
| <i>Helianthemum ledifolium</i> (L.) Mill. Subsp. <i>ledifolium</i> .       | Th                 | LC                  |        |          | R4, R18   | All geographic divisions except Ms                        |
| <i>Tuberaria guttata</i> (L.) Fourr.                                       | Th                 | LC                  |        |          | R36, R55, R57   | AA, HA, MA, Mam, Man, Om, LM, R                           |
| CONVOLVULACEAE   |                    |                     |        |          |   |   |
| <i>Convolvulus althaeoides</i> L.  | Hem                | LC                  |        |          | R1, R2, R3, R4, R9, R10, R11, R16, R17, R18, R19, R20, R21, R22, R23, R24, R25, R26, R27, R28, R30, R34, R37, R40, R43, R44, R46, R48, R50, R51         | All geographic divisions, rare in arid and desert regions |
| <i>Convolvulus sabatius</i> Viv. subsp. <i>mauritanicus</i> (Boiss.) Murb. | Hem                | LC                  |        | EA       | R52   | HA, MA, Man, Op, LM, R                                    |
| <i>Convolvulus tricolor</i> L.   | Th                 | LC                  |        |          | R50   | Ms, AA?, Mam, Man, Op (lower Moulouya), Om, R             |
| <i>Cuscuta epithymum</i> (L.) L.   | Th                 | LC                  |        |          | R3  | Non-Saharan Morocco                                       |
| <i>Cuscuta planiflora</i> Ten.   | Th                 | LC                  |        |          | R4  | All geographic divisions except Ms                        |
| CRASSULACEAE   |                    |                     |        |          |   |   |
| <i>Petrosedum forsterianum</i> (Sm.) Grulich                               | Ch                 | LC                  |        |          | R28, 53   | MA, Man, R  |
| <i>Pistorinia breviflora</i> Boiss.  | Th                 | LC                  |        |          | R39, R41, R46, R47  | AA Mam Man  |

TABLE 2. Cont.

| Division, Families and Species  | Life form spectrum | Assessment Criteria | Rarity | Endemism | Occurrence in the study area (relevés see table 2 and Fig. 3) | Geographic distribution in Morocco  |
|---|--------------------|---------------------|--------|----------|---|---|
| <i>Sedum modestum</i> Ball.   | Th                 | LC                  |        | E        | R14, R38, R39   | AA, HA, MA, Mam, Man  |
| <i>Sedum mucizonia</i> (Ortega) Raym.-Hamet.                                    | Th,                | LC                  |        | EIA      | R39, R41, R44, R45, R46, R47, R50, R51                        | HA, MA, Mam, Man, Op, Om, LM, R   |
| <i>Sedum rubens</i> L.  | Th                 | LC                  |        |          | R11, R17, R47   | AA, HA, MA, Mam, Man, Op, R   |
| <i>Sedum wilczekianum</i> Font Quer   | Ch                 | LC                  | RR     | E        | R53   | Man (j. Zerhou), R (Marsa-Kbira; Ras Sidi-el-Abed)                        |
| <i>Umbilicus rupestris</i> (Salisb.) Dandy.                                     | G                  | LC                  |        |          | R4, R6, R13, R17, R20, R25, R29, R36, R39, R51                | HA, MA, Mam, Man, Om, LM, R   |
| CUCURBITACEAE   |                    |                     |        |          |   |   |
| <i>Bryonia cretica</i> subsp. <i>dioica</i> (Jaeq.) Tutin                       | G                  | LC                  |        |          | R42, R48  | All geographic divisions  |
| ERICACEAE   |                    |                     |        |          |   |   |
| <i>Arbutus unedo</i> L.   | Ph                 | LC                  |        |          | R1, R5, R6, R7, R8, R9, R10, R28, R39, R48                    | AA, HA, MA, Mam, Man, Om, LM, R   |
| EUPHORBIACEAE   |                    |                     |        |          |   |   |
| <i>Euphorbia dracunculoides</i> subsp. <i>glebulosa</i> (Coss. & Durieu) Maire. | Hem                | LC                  |        |          | R43   | Ms, As, HA, Mam (Souss), Man?, LM, R oriental.,                           |
| <i>Euphorbia falcata</i> L.   | Th                 | LC                  |        |          | R20, R23, R24, R47  | All geographic divisions except Ms MA, Mam, Man, Om (Bni Snassène), LM, R |
| <i>Euphorbia medicaginea</i> Boiss.   | Th                 | LC                  |        |          | R43   |   |
| <i>Euphorbia segetalis</i> L.   | Th                 | LC-                 | RR     |          | R37   | HA MA (Bou-iblane) Man (Gharb) Op Om (Bni Snassène) LM (J. Gourougou) R   |
| FABACEAE  |                    |                     |        |          |   |   |
| <i>Mercurialis annua</i> L.   | Th                 | LC                  |        |          | R23, R36, R38, R43  | All geographic divisions  |
| FABACEAE  |                    |                     |        |          |   |   |
| <i>Adenocarpus telonenis</i> (Loisel.) DC.                                      | Ph                 | LC                  |        |          | R1, R5, R6, R7, R8, R9, R10, R12, R21, R28, R53               | MA, Man (Zerhou; Zgharine), R   |
| <i>Anagyris foetida</i> L.  | Ph                 | LC                  |        |          | R4  | AA, HA, MA, Mam, Man, LM (Bokkoya) R                                      |
| <i>Anthyllis hamosa</i> Desf.   | Th                 | LC                  |        |          | R2, R17, R19, R20, R21, R23, R27, R40, R43, R45, R47, R50     | AA, Western Mam, Man, R.  |
| <i>Anthyllis vulneraria</i> L.  | Hem                | LC                  |        |          | R3, R25   | Non-Saharan Morocco   |



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|---|--------------------|---------------------|--------|----------|---|--|
| <i>Biserrula epiglottis</i> (L.)<br>Coulot, Rabaute & J.-M.<br>Tison  | Th                 | LC                  |        |          | R20, R40, R43   | AA, HA, MA, Mam, Man, Om, LM, R  |
| <i>Calicotome infesta</i> (C. Presl)<br>Guss.                         | Ph                 | LC                  |        |          | R3, R20, R38  | MA, Man (Prerif; middle Sebou), Om<br>LM, R                                  |
| <i>Ceratonia siliqua</i> L.   | Ph                 | LC                  |        |          | R1, R3, R5, R11, R16, R20, R21, R22, R23, R27, R34, R35, R37, R38, R39, R40, R42, R43, R44, R45, R47, R48, R49, R53, R56, R57 | As, AA, HA, MA, Mam, Man, Op?,<br>Om, LM, R                                  |
| <i>Coronilla valentina</i> subsp.<br><i>pentaphylla</i> (Desf.) Batt. | Ph                 | LC                  |        |          | R1  | HA, MA, Mam (Bni Moussa), Man<br>(Prerif), Om (Bni Snassène), LM.            |
| <i>Coronilla valentina</i> L.   | Ph                 | LC                  |        |          | R10, R14, R23, R28, R29   | AA, HA, MA, Mam, Man, Om, LM, R  |
| <i>Coronilla viminalis</i> Salisb.                                    | Ph                 | LC                  | EC     |          | R3, R22, R27, R44, R48, R49, R50, R52   | Ms (O. Noun; Khneg Lehnam), AA,<br>HA, MA, Mam, Man, Op (NE of<br>Midelt), R |
| <i>Cytisus arboreus</i> (Desf.)<br>DC.                                | Ph                 | LC                  |        |          | R1, R3, R8, R10, R17, R25, R28, R41   | AA, HA, MA, Mam, Man, Om, LM, R  |
| <i>Ebenus pinnata</i> Aiton.  | Ch                 | LC                  |        |          | R1, R3, R21, R22, R37, R54  | AA, HA, MA, Mam, Man, Op, Om,<br>LM, R                                       |
| <i>Erophaca baetica</i> (L.) Boiss.                                   | G                  | LC                  |        |          | R1, R2, R3, R5, R6, R7, R9, R10, R27, R28, R48  | AA, HA, Mam, Man, Om (Bni<br>Snassène), LM, R                                |
| <i>Glycyrrhiza foetida</i> Desf.                                      | G                  | NT                  |        |          | R40, R42  | Central Western Man, R.  |
| <i>Hippocrepis ciliata</i> Willd.                                     | Th                 | LC                  |        |          | R54   | Ms, As, AA, HA, MA, Mam, Man, Op,<br>Om, LM, R                               |
| <i>Lotus conimbricensis</i> Brot.                                     | Th                 | LC                  |        |          | R47   | HA, MA, Mam (Souss), Man, LM?, R   |
| <i>Lotus creticus</i> L.  | Ch                 | LC                  |        |          | R56.  | Mam, Man (Gharb), Om (Bni<br>Snassène), LM, R                                |
| <i>Lotus ormithopodioides</i> L.                                      | Th                 | LC                  |        |          | R4, R38   | AA, Mam (Chaouia- Doukkala), Man,<br>Om (Bni Snassène), LM, R                |
| <i>Lotus parviflorus</i> Desf.  | Th                 | LC                  |        |          | R47   | Mam (Chaouia- Doukkala), Man,<br>LM?, R                                      |
| <i>Lotus rectus</i> L.  | Ch                 | DD                  |        |          | R3, R42.  | AA (o. Noun), HA, MA, Mam, Man,<br>Om (Bni Snassène), R.                     |
| <i>Lotus Tetragonolobus</i> L.  | Th                 | LC                  |        |          | R4  | HA, MA, Mam, Man, Om, LM, R  |

TABLE 2. Cont.

| Division, Families and Species                   | Life form spectrum | Assessment Criteria | Rarity | Endemism | Occurrence in the study area (relevés see table 2 and Fig. 3)  | Geographic distribution in Morocco                             |
|--|--------------------|---------------------|--------|----------|--|--|
| <i>Medicago minima</i> (L.)<br>Bartal.           | Th                 | LC                  |        |          | R9, R21, R23, R38, R43, R46, R47, R56  | All geographic divisions                                       |
| <i>Medicago orbicularis</i> (L.)<br>Bartal.      | Th                 | LC                  |        |          | R11, R41, R46  | Western AA, HA, MA, Mam, Man, Op (W of Oujda), Om, LM, R       |
| <i>Medicago truncatula</i> Gaertn.               | Th                 | LC                  |        |          | R4, R19, R38   | AA, HA, MA, Mam, Man, Op, Om, LM, R                            |
| <i>Ononis hispida</i> Desf.                      | Ch                 | LC                  |        |          | R53  | MA, Man, Om, LM, R   |
| <i>Ononis jahandiezii</i> Maire & Weiller.       | Th                 | CR                  | RR     | E        | R48, R55   | Man (j. Zerhoun)   |
| <i>Ononis natrix</i> L.                          | Ch                 | LC                  |        |          | R3, R18, R19, R22, R23, R27, R47, R49, R56   | All geographic divisions                                       |
| <i>Ononis pendula</i> Desf.                      | Th                 | LC                  |        |          | R57  | Oceanic Ms, AA, HA, MA, Mam, Man, Om, LM, R                    |
| <i>Ononis reclinata</i> L.                       | Th                 | LC                  |        |          | R17  | AA, HA, MA, Mam, Man, Op, Om, LM, R                            |
| <i>Ononis thomsonii</i> Ball ex Oliv.            | Hem                | NT                  |        | E        | R9   | AA (Saghro), HA, MA, Man (Zerhoun), R (j. Lakraâ; j. Kelti)    |
| <i>Ononis viscosa</i> L. subsp. <i>viscosa</i> . | Th                 | LC                  |        |          | R4   | HA (Asni), MA, Mam (Settat), Man (Fes; Gharb)                  |
| <i>Ornithopus compressus</i> L.                  | Th                 | LC                  |        |          | R5   | AA, HA, MA, Mam, Man, R  |
| <i>Retama monosperma</i> (L.) Boiss.             | Ph                 | LC                  |        |          | R54  | Ms, AA, HA, Mam, Om, LM, R                                     |
| <i>Scorpiurus muricatus</i> L.                   | Th                 | LC                  |        |          | R9, R46  | (Ms), AA, HA, MA, Mam, Man, Op, Om, LM, R                      |
| <i>Scorpiurus vermiculatus</i> L.                | Th                 | LC                  |        |          | R21  | MA, Mam, Man, Om (Bni Snassène), LM, R                         |
| <i>Trifolium angustifolium</i> L.                | Th                 | LC                  |        |          | R1, R2, R4, R5, R9, R10, R17, R18, R20, R21, R24, R27, R37, R38, R40, R41, R44, R45, R50, R55, R57       | AA, HA, MA, Mam, Man, Om, LM, R                                |
| <i>Trifolium arvense</i> L.                      | Th                 | LC                  |        |          | R41  | AA, HA, MA, Mam, Man, LM, R                                    |
| <i>Trifolium campestre</i> Schreb.               | Th                 | LC                  |        |          | R5, R6, R7, R8, R10, R16, R19, R24, R28, R36, R38, R41, R44, R45, R46, R47, R48, R50, R54, R55, R56, R57 | AA, HA, MA, Mam, Man, Op, Om, LM, R                            |
| <i>Trifolium cherleri</i> L.                     | Th                 | LC                  |        |          | R5   | HA, MA, Mam (Chaouia-Doikkala), Man, Om (Bni Snassène)?, LM, R |

TABLE 2. Cont.

| Division, Families and Species                | Life form spectrum | Assessment Criteria | Rarity | Endemism | Occurrence in the study area (relevés see table 2 and Fig. 3)   | Geographic distribution in Morocco                              |
|---|--------------------|---------------------|--------|----------|---|---|
| <i>Trifolium glomeratum</i> L.                | Th                 | LC                  |        |          | R18, R21, R24, R45, R46, R47, R55   | AA, HA, MA, Mam, Man, Om, LM, R                                 |
| <i>Trifolium scabrum</i> L.                   | Th                 | LC                  |        |          | R57   | AA, Western HA, MA, Mam, Man, Om (Bni Snassène), LM, R          |
| <i>Trifolium stellatum</i> L.                 | Th                 | LC                  |        |          | R2, R6, R11, R17, R18, R24, R28, R38, R39, R40, R41, R44, R45, R46, R47, R48, R53, R54, R55, R57  | Western AA, HA, MA, Mam, Man, Om, LM, R                         |
| <i>Trifolium tomentosum</i> L.                | Th                 | LC                  |        |          | R6, R28, R41, R46   | AA, HA, MA, Mam, Man, Om, LM, R                                 |
| <i>Vicia benghalensis</i> L.                  | Th                 | LC                  |        |          | R5  | All geographic divisions  |
| <i>Vicia disperma</i> DC.                     | Th                 | LC                  |        |          | R5, R41   | Western AA, MA, Mam, Man, Om (Bni Snassène), LM, R              |
| <i>Vicia lutea</i> L.                         | Th                 | LC                  |        |          | R5, R19, R55  | All geographic divisions  |
| <i>Vicia sativa</i> L. subsp. <i>sativa</i> . | Th                 | LC                  |        |          | R5, R12, R16, R18, R26, R39   | Northern Morocco and elsewhere                                  |
| FAGACEAE                                      |                    |                     |        |          |   |   |
| <i>Quercus rotundifolia</i> Lam.              | Ph                 | LC                  |        |          | R1, R2, R3, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R16, R17, R18, R19, R22, R24, R25, R26, R28, R31, R32, R33, R34, R35, R36, R37, R39, R40, R41, R44, R45, R46, R47, R48, R50, R51, R52, R53, R55, R57 | All geographic divisions except Ms and Op                       |
| <i>Quercus suber</i> L.                       | Ph                 | LC                  |        |          | R1  | HA, MA, Man, Om, LM, R  |
| GENTIANACEAE                                  |                    |                     |        |          |   |   |
| <i>Blackstonia perfoliata</i> (L.) Huds.      | Th                 | LC                  |        |          | R5, R7, R37   | HA, MA, Man, Om, LM, R  |
| <i>Centaurium erythraea</i> Rafn.             | Th                 | DD                  |        |          | R5, R18, R37, R45   | Western AA, HA, MA, Mam, Man, Om, LM, R                         |
| <i>Schenkia spicata</i> (L.) G.Mans.          | Th                 | NT                  |        |          | R27   | Ms, As?, Western AA, HA, MA, Mam, Man, Om (Bni Snassène), LM, R |
| GERANIACEAE                                   |                    |                     |        |          |   |   |
| <i>Erodium alnifolium</i> Guss.               | Th                 | NA                  | RR     |          | R5  | Man (J. Zerhoun)  |
| <i>Erodium chium</i> (Burm. fil.) Willd.      | Th                 | LC                  |        |          | R39   | All geographic divisions  |
| <i>Erodium ciconium</i> (L.) L'Hér.           | Th                 | LC                  |        |          | R39   | AA?, HA, Mam, Man, Om (Bni Snassène), LM, R                     |
| <i>Erodium malacoides</i> (L.) L'Hér.         | Th                 | LC                  |        |          | R11   | Ms, AA, HA, MA, Mam, Man, Op, LM, R                             |

TABLE 2. Cont.

| Division, Families and Species        | Life form spectrum | Assessment Criteria | Rarity | Endemism | Occurrence in the study area (relevés see table 2 and Fig. 3)                                   | Geographic distribution in Morocco   |
|---------------------------------------|--------------------|---------------------|--------|----------|---|--|
| <i>Erodium moschatum</i> (L.) L'Hér.  | Th                 | LC                  |        |          | R4, R36   | HA, MA, Mam, Man, Om, LM, R  |
| <i>Geranium dissectum</i> L.          | Th                 | LC                  |        |          | R4, R14   | Western AA, HA, MA, Mam, Man, Op, LM, R  |
| <i>Geranium lucidum</i> L.            | Th                 | LC                  |        |          | R14, R52  | HA, MA, Man, Om, LM, R   |
| <i>Geranium molle</i> L.              | Th                 | LC                  |        |          | R13, R14, R26, R30, R31, R32, R33, R36  | AA, HA, MA, Mam, Man, Op, Om, LM, R  |
| <i>Geranium purpureum</i> Vill.       | Th                 | LC                  |        |          | R6, R7, R8, R10, R14, R16, R18, R24, R25, R26, R28, R30, R40, R51, R52                          | AA, HA, MA, Mam, Man, Om, LM, R  |
| <i>Geranium rotundifolium</i> L.      | Th                 | LC                  |        |          | R10   | All divisions except Ms  |
| HYPERICACEAE                          |                    |                     |        |          |   |  |
| <i>Hypericum callithyrsus</i> Coss.   | Ch                 | EN                  | RR     | EI       | R48   | HA (Cedar forest of J. Ayachi), MA (cliff of j. Ikhouid; towards Bab Klati), R (j. Laktâa) |
| <i>Hypericum montanum</i> L.          | Ch                 | NT                  |        |          | R5, R9, R36, R37  | Mam, Man, Om, LM, R.   |
| <i>Hypericum tomentosum</i> L.        | Hem                | NT                  |        |          | R4, R18, R19, R38   | HA (Rich), MA (Ifrane), Mam, Man, Op, LM, R  |
| LAMIACEAE                             |                    |                     |        |          |   |  |
| <i>Ajuga iva</i> (L.) Schreb.         | Hem                | LC                  |        |          | R1, R4, R12, R17, R18, R19, R22, R24, R25, R36, R37, R38, R40, R45                              | All geographic divisions   |
| <i>Cleonia lusitanica</i> (L.) L.     | Th                 | LC                  |        |          | R1, R2, R3, R11, R18, R20, R21, R22, R44, R45, R46, R50   | HA, MA, Mam, Man, Op (Bni Snassène), LM, R   |
| <i>Clinopodium nepeta</i> (L.) Kuntze | Ch                 | LC                  |        |          | R5, R6, R8, R10, R16, R18, R19, R31, R32, R34, R37, R39, R40, R41, R44, R45, R46, R55           | Forests and matorrals, stony rangelands, rocks; plains and low mountains                   |
| <i>Lamium amplexicaule</i> L.         | Th                 | LC                  |        |          | R16, R25, R30, R37, R39   | All geographic divisions   |
| <i>Lavandula multifida</i> L.         | Ch                 | LC                  |        |          | R2, R3, R4, R17, R18, R19, R20, R21, R22, R23, R27, R38, R43, R44, R47, R49, R50, R51, R55, R56 | All geographic divisions (except Non-Saharan Morocco)                                      |
| <i>Lavandula stoechas</i> L.          | Ch                 | LC                  |        |          | R2, R5, R6, R8, R9, R20, R28, R48   | Mam, Man, LM, Om, R  |
| <i>Marrubium vulgare</i> L.           | Ch                 | LC                  |        |          | R4, R36, R37, R38, R44, R49, R53, R54, R55  | All geographic divisions   |
| <i>Mentha pulegium</i> L.             | Hem                | LC                  |        |          | R6, R42   | All geographic divisions (except Non-Saharan Morocco)                                      |

TABLE 2. Cont.

| Division, Families and Species                                  | Life form spectrum | Assessment Criteria | Rarity | Endemism | Occurrence in the study area (relevés see table 2 and Fig. 3)                | Geographic distribution in Morocco                           |
|---|--------------------|---------------------|--------|----------|--|--|
| <i>Origanum compactum</i> Benth.                                | Ch                 | VU                  |        | EI       | R5, R11, R25, R26, R45   | MA, Mam, Man, R  |
| <i>Phlomis herba-venti</i> L.                                   | Hem                | LC                  |        |          | R5   | Ms?, As, HA, MA, Mam, Man, Om, LM, R                         |
| <i>Prasium majus</i> L.   | Ph                 | LC                  |        |          | R3, R17, R18, R20, R23, R29, R35, R38, R39, R41, R42, R48, R53               | AA, HA, MA, Mam, Man, Op, Om, LM, R                          |
| <i>Pseudodictamnus hirsutus</i> subsp. <i>hirsutus</i>          | Ch                 | LC                  |        |          | R4, R20, R34, R37, R38   | All geographic divisions (except Non-Saharan Morocco)        |
| <i>Salvia verbenaca</i> L.                                      | Hem                | LC                  |        |          | R2, R4, R11, R18, R19, R34, R36, R41   | All geographic divisions                                     |
| <i>Stachys arvensis</i> (L.) L.                                 | Th                 | LC                  |        |          | R24  | Non-Saharan Morocco  |
| <i>Stachys circinata</i> L'Hér.                                 | Hem                | LC                  |        |          | R14, R29, R39, R52, R53  | MA, Man, Op?, LM, R.   |
| <i>Stachys ocymastrum</i> (L.) Briq.                            | Th                 | LC                  |        |          | R11, R17, R23, R40, R41, R43, R44, R50                                       | Morocco not Saharan  |
| <i>Stachys saxicola</i> subsp. <i>villosissima</i> (Ball) Maire | Hem                | LC                  | RR     | E        | R38  | MA (Taza; Sidi Abdellah gorge), Mam (Sidi Ouasmin)?, (n.v.). |
| <i>Teucrium barbarum</i> Jahand. & Maire.                       | Ph                 | EN                  | R      | E        | R11, R37   | Man, R   |
| <i>Teucrium chamaedrys</i> L.                                   | Ch                 | LC                  |        |          | R18  | Ms (NW of Boudnib), HA, MA, R                                |
| <i>Teucrium decipiens</i> Coss. & Balansa.                      | Th                 | LC                  |        | E        | R1, R5, R17, R18, R19, R20, R24, R27, R37, R38, R40, R41, R43, R44, R47, R50 | HA, MA, Mam, Man, Om (Bni Snassène), LM, R                   |
| <i>Teucrium fruticosum</i> L.                                   | Ph                 | LC                  |        |          | R5, R28  | (Ms), AA, HA, MA, Mam, Man, Om, LM, R                        |
| <i>Teucrium polium</i> L.                                       | Ch                 | LC                  |        |          | R2, R3, R11, R18, R21, R37, R38, R45, R53                                    | HA, MA, Mam, Man, Op, Om, LM, R                              |
| <i>Teucrium pseudo-chamaepitys</i> L.                           | Ch                 | LC                  |        |          | R1, R2, R3   | HA, MA, Mam, Man, Op, Om, LM, R                              |
| <i>Teucrium resupinatum</i> Desf.                               | Th                 | LC                  |        |          | R40, R41, R44, R45, R46  | MA?, Mam, Man, Op, Om (Bni Snassène) LM, R                   |
| <i>Thymus bleicherianus</i> Pomel.                              | Ch                 | EN                  | RR     | EA?      | R12  | Man (Prerif; Moyen Sbou), Om (N of Tafoghalt)                |
| LINACEAE  |                    |                     |        |          |  |  |
| <i>Linum strictum</i> L.  | Th                 | LC                  |        |          | R2, R4, R9, R11, R17, R19, R21, R24, R38, R41, R43, R45, R46, R50.           | All geographic divisions                                     |
| <i>Linum tenue</i> Desf.  | Th                 | LC                  |        |          | R21, R44, R45, R54   | AA littoral?, HA, MA, Mam, Man, Om (Bni Snassène), LM, R     |

TABLE 2. Cont.

| Division, Families and Species             | Life form spectrum | Assessment Criteria | Rarity | Endemism | Occurrence in the study area (relevés see table 2 and Fig. 3)   | Geographic distribution in Morocco                         |
|--|--------------------|---------------------|--------|----------|---|--|
| <i>Linum usitatissimum</i> L.              | Th                 | NA                  |        |          | R20, R41, R46   | Cultivated and subspontaneous especially in Mam Man, LM, R |
| LYTHRACEAE                                 |                    |                     |        |          |   |  |
| <i>Lythrum salicaria</i> L.                | G                  | LC                  |        |          | R42   | Mam, Man, R  |
| MALVACEAE                                  |                    |                     |        |          |   |  |
| <i>Malva hispanica</i> L.                  | Th                 | LC                  |        | EIA      | R1, R4, R9, R11, R17, R18, R20, R24, R27, R37, R41, R44, R50  | AA, HA, MA, Mam, Man, LM, Om, R                            |
| <i>Malva olbia</i> (L.) Alef.              | Ph                 | LC                  |        |          | R2, R42, R43  | MA, Mam, Man, LM (Ahfir), R                                |
| MORACEAE                                   |                    |                     |        |          |   |  |
| <i>Ficus carica</i> L.                     | Ph                 | LC                  |        |          | R51, R53  | Non-Saharan Morocco  |
| OLEACEAE                                   |                    |                     |        |          |   |  |
| <i>Chrysojasminum fruticans</i> (L.) Banfi | Ph                 | LC                  |        |          | R2, R3, R5, R7, R10, R19, R20, R22, R23, R25, R27, R28, R29, R32, R38, R39, R40, R41, R42, R44, R46, R47, R48, R49, R50, R53  | As, AA, HA, MA, Mam, Man, Om, LM, R                        |
| <i>Fraxinus angustifolia</i> Vahl.         | Ph                 | LC                  |        |          | R5, R10, R42  | HA, MA, Mam, Man Om, LM, R                                 |
| <i>Olea europaea</i> L.                    | Ph                 | LC                  |        |          | R1, R2, R3, R4, R5, R6, R7, R9, R11, R12, R16, R17, R18, R19, R20, R21, R22, R23, R24, R27, R30, R34, R35, R36, R38, R41, R42, R43, R44, R45, R46, R47, R48, R49, R50, R51, R53, R54, R55, R56, R57 | Non-Saharan Morocco  |
| <i>Phillyrea latifolia</i> L.              | Ph                 | LC                  |        |          | R2, R3, R5, R6, R8, R9, R21, R22, R23, R28, R29, R31, R32, R34, R39, R40, R41, R46, R48   | As, AA, HA, MA, Mam, Man, Om, LM, R                        |
| OXALIDACEAE                                |                    |                     |        |          |   |  |
| <i>Oxalis pes-caprae</i> L.                | G                  | LC                  |        |          | R4  | Mam, Man, Op, Om, LM, R                                    |
| PAPAVERACEAE                               |                    |                     |        |          |   |  |
| <i>Fumaria agraria</i> Lag.                | Th                 | LC                  |        |          | R53   | AA, HA, MA, Mam, Om, LM, R                                 |
| <i>Papaver rhoeas</i> L.                   | Th                 | LC                  |        |          | R51   | All geographic divisions                                   |
| <i>Roemeria sicula</i> (Guss.) ined.       | Th                 | LC                  |        |          | R38, R39  | All geographic divisions                                   |
| <i>Rupicapnos africana</i> (Lam.) Pomet.   | Th                 | LC                  |        | E IA     | R49   | HA, MA, Man, Op, Om, LM, R                                 |
| PLANTAGINACEAE                             |                    |                     |        |          |   |  |
| <i>Chaenorhinum villosum</i> (L.) Lange.   | Hem                | LC                  |        | EIA      | R49, R52  | As, HA, MA, Man, Op?, Om (Bni Snassène), LM, R             |



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| Division, Families and Species                    | Life form spectrum | Assessment Criteria | Rarity | Endemism | Occurrence in the study area (relevés see table 2 and Fig. 3)                       | Geographic distribution in Morocco  |
|---|--------------------|---------------------|--------|----------|---|---|
| <i>Globularia albyum</i> L.                       | Ch                 | LC                  |        |          | R1, R2, R3, R9, R20, R21, R22, R38, R48   | All geographic divisions  |
| <i>Kickxia spuria</i> (L.) Dumort.                | Th                 | LC                  |        |          | R56   | Ms (around Tinfouche; N of Hassi Beïda; o. Oum el-Assel), Mam, Man, Op, Om, LM, R |
| <i>Linaria tristis</i> subsp.                     |                    |                     |        |          |   |   |
| <i>Pectinata</i> (Pau & Font Quer) Maire          | Hem                | LC                  | R      | E        | R27, R39, R41, R48, R49, R52  | MA (Tazekka), Man, LM, R  |
| <i>Misopates orontium</i> (L.) Raf.               | Th                 | LC                  |        |          | R19, R27, R37   | Non-Saharan Morocco   |
| <i>Plantago afra</i> L.                           | Th                 | LC                  |        |          | R4, R17, R23  | All geographic divisions  |
| <i>Plantago coronopus</i> L.                      | Th                 | LC                  |        |          | R12   | All geographic divisions  |
| <i>Plantago lagopus</i> L.                        | Th                 | LC                  |        |          | R11, R38, R46, R47, R55, R57  | All geographic divisions  |
| <i>Veronica hederifolia</i> L.                    | Th                 | LC                  |        |          | R10, R14, R15, R18  | As, AA (Siroua), HA, MA, Man, Om (Bni Snassène), LM R.                            |
| PLUMBAGINACEAE                                    |                    |                     |        |          |   |   |
| <i>Limonium lobatum</i> (L. fil.) Chaz.           | Th                 | LC                  |        |          | R4  | All geographic divisions  |
| <i>Plumbago europaea</i> L.                       | Ch                 | LC                  |        |          | R4, R18   | AA, HA, MA, Mam, Man, Om, LM, R   |
| POLYGONACEAE                                      |                    |                     |        |          |   |   |
| <i>Rumex acetosa</i> L.                           | Hem                | LC                  |        |          | R16   | AA (Siroua), HA, MA   |
| <i>Rumex bucephalophorus</i> L.                   | Th                 | LC                  |        |          | R15, R17, R19, R23, R24, R26, R36, R37, R38, R39, R46, R47, R50, R51, R55, R56, R57 | HA, MA, Mam, Man, Op, Om, LM, R   |
| <i>Rumex thyrsoides</i> Desf.                     | Hem                | LC                  |        |          | R4  | AA, HA, MA, Mam, Man, Om, LM, R   |
| PRIMULACEAE                                       |                    |                     |        |          |   |   |
| <i>Asterolinon limum-stellatum</i> (L.) Duby.     | Th                 | LC                  |        |          | R36   | Everywhere, except in the Sahara  |
| <i>Lysimachia arvensis</i> (L.) U.Manns & Anderb. | Th                 | LC                  |        |          | R4, R7, R10, R11, R27, R30, R33, R36, R41, R43, R48, R50                            | All geographic divisions  |
| RANUNCULACEAE                                     |                    |                     |        |          |   |   |
| <i>Clematis cirrhosa</i> L.                       | Ph                 | LC                  |        |          | R1, R6, R10, R16, R17, R29, R35, R39, R42   | MA, Mam, Man, Om, LM, R   |
| <i>Delphinium peregrinum</i> L.                   | Th                 | NA                  |        |          | R26, R36, R44   | HA, MA, Mam, Man, Op, LM, R   |
| <i>Nigella arvensis</i> L.                        | Th                 | LC                  |        |          | R40   | HA, MA, Mam, Man, LM, R   |
| <i>Nigella damascena</i> L.                       | Th                 | LC                  |        |          | R46   | HA, MA, Mam, Man, LM, R   |

TABLE 2. Cont.

| Division, Families and Species  | Life form spectrum | Assessment Criteria | Rarity | Endemism | Occurrence in the study area (relevés see table 2 and Fig. 3)   | Geographic distribution in Morocco                          |
|---|--------------------|---------------------|--------|----------|---|---|
| <i>Nigella papillosa</i> subsp. <i>atlantica</i> (Murb.) Amich ex G. Lopez. | Th                 | LC                  |        |          | R46   | HA, MA, Mam, Man  |
| <i>Ranunculus bulbosus</i> L.   | Hem                | LC                  |        |          | R17, R37  | HA (Arround; Rhat to Tirsal), Man (rare)                    |
| <i>Ranunculus bullatus</i> L.   | Hem                | LC                  |        |          | R4, R5, R10, R24, R25, R42  | AA, HA, MA, Mam, Man, Om, LM, R                             |
| <i>Ranunculus paludosus</i> Poir.   | Hem                | LC                  |        |          | R4, R13, R26  | AA, HA, MA, Mam, Man, Op, LM, R                             |
| RESEDACEAE  |                    |                     |        |          |   |   |
| <i>Reseda alba</i> L.   | Th                 | LC                  |        |          | R4, R37   | All geographic divisions except As                          |
| <i>Reseda lutea</i> L.  | Th                 | LC                  |        |          | R2, R4, R5, R47   | All geographic divisions except As                          |
| RHAMNACEAE  |                    |                     |        |          |   |   |
| <i>Rhamnus alaternus</i> L.   | Ph                 | LC                  |        |          | R2, R5, R6, R7, R8, R10, R28, R39, R54<br>R3, R5, R7, R12, R16, R18, R19, R20, R21, R22,<br>R23, R25, R27, R34, R36, R37, R38, R39, R40,<br>R41, R43, R44, R45, R49, R52, R53, R54, R55,<br>R57 | AA, HA, MA, Mam, Man, Om, LM, R<br>All geographic divisions |
| <i>Ziziphus lotus</i> (L.) Lam.   | Ph                 | LC                  |        |          | R4, R20, R54  | All geographic divisions                                    |
| ROSACEAE  |                    |                     |        |          |   |   |
| <i>Agrimonia eupatoria</i> L.   | Hem                | LC                  |        |          | R38   | HA, MA, Mam, Man, R   |
| <i>Alchemilla floribunda</i> Murb.  | Th                 | LC                  |        |          | R12   | HA, MA, Man, Om, LM, R                                      |
| <i>Crataegus monogyna</i> Jacq.   | Ph                 | LC                  |        |          | R5, R6, R7, R8, R10, R11, R15, R16, R17, R18,<br>R19, R20, R24, R25, R26, R28, R29, R32, R34,<br>R35, R37, R38, R39, R41, R42, R45, R53   | All geographic divisions except Ms and As                   |
| <i>Potentilla reptans</i> L.  | Hem                | LC                  |        |          | R10, R42  | HA, MA, Mam, Man, Op, Om, LM, R                             |
| <i>Rosa canina</i> L.   | Ph                 | LC                  |        |          | R7, R10, R18, R19, R39, R42, R53  | AA, HA, MA, Man, Om, R                                      |
| <i>Rubus ulmifolius</i> Schott  | Ph                 | LC                  |        |          | R5, R6, R7, R8, R10, R28, R42   | All geographic divisions except Ms and As                   |
| <i>Sanguisorba minor</i> Scop.  | G                  | LC                  |        |          | R1, R4, R5, R6, R7, R9, R10, R12, R13, R14,<br>R15, R16, R17, R18, R19, R21, R25, R26, R28,<br>R32, R35, R36, R37, R38, R39, R41, R43, R45,<br>R48, R52, R53                                    | Everywhere except in Ms and LM                              |
| RUBIACEAE   |                    |                     |        |          |   |   |
| <i>Asperula arvensis</i> L.   | Th                 | LC                  |        |          | R11   | AA, HA, MA, Mam, Man, Om (Jerada), LM, R                    |

TABLE 2. Cont.

| Division, Families and Species                            | Life form spectrum | Assessment Criteria | Rarity | Endemism | Occurrence in the study area (relevés see table 2 and Fig. 3)                                  | Geographic distribution in Morocco  |
|---|--------------------|---------------------|--------|----------|--|---|
| <i>Crucianella angustifolia</i> L.                        | Th                 | LC                  |        |          | R11, R19, R20, R38, R41, R43, R47, R50   | AA, HA, MA, Mam, Man, Op, Om, LM, R   |
| <i>Cynanchica aristata</i> (L.f.) P.Caputo & Del Guacchio | Ch                 | LC                  |        |          | R3, R11, R18, R22  | AA (Siroua), HA, MA, Mam (Souss), Man (Zaiane), Om (Bni Snassène), LM?, R   |
| <i>Galium aparine</i> L.                                  | Th                 | LC                  |        |          | R14, R25   | AA, HA, MA, Mam, Man, Om, LM, R   |
| <i>Galium bourgaeannum</i> Coss. ex Ball                  | Hem                | LC                  |        | EA       | R8, R9, R45  | AA, HA, MA (ElHajeb), Mam (Agadir- Irhir; j. Kharrouba in Tadnest), Man (j. Zerhoun; Lakouar rocks near Oualili), R (Kef El-Ghar) |
| <i>Galium lucidum</i> All.                                | Hem                | LC                  |        |          | R11  | Central HA (j. Gourza; etc.?), MA (Ain- Leuh; Bekrit), Man (Preif- Middle Sbou), LM, R Central                                    |
| <i>Galium setaceum</i> Lam.                               | Th                 | LC                  |        |          | R11, R38   | As, AA, HA, Mam, Man, Om, LM, R   |
| <i>Galium verrucosum</i> Huds.                            | Th                 | LC                  |        |          | R18, R19   | Ms (Assa), AA, HA, MA, Mam, Man, Op (lower Moulouya), Om, LM, R   |
| <i>Hexaphylla hirsuta</i> (Desf.) P.Caputo & Del Guacchio | Ch                 | LC                  |        |          | R19, R21, R23, R38   | As, AA, HA, MA, Mam, Man, Op (Lower Moulouya), Om, LM, R  |
| <i>Rubia peregrina</i> L.                                 | Ch                 | LC                  |        |          | R1, R5, R6, R7, R8, R10, R11, R18, R19, R20, R23, R28, R34                                     | HA, MA, Mam, Man, Om, LM, R   |
| <i>Sherardia arvensis</i> L.                              | Th                 | LC                  |        |          | R1, R6, R10, R17, R25, R28, R36  | All geographic divisions  |
| <i>Theligionum cynocrambe</i> L.                          | Th                 | LC                  |        |          | R39  | Mam, Man, LM, Om?, R  |
| <i>Valantia muralis</i> L.                                | Th                 | LC                  |        |          | R39  | Mam (Chaouia-Doukkala), Man, Om, LM, R  |
| RUTACEAE  |                    |                     |        |          |  |   |
| <i>Ruta angustifolia</i> Pers.                            | Ch                 | LC                  |        |          | R3, R18, R19, R21, R22, R23, R37, R56  | HA, MA, Mam, Man, Om (Bni Snassène), LM, R  |
| <i>Ruta montana</i> (L.) L.                               | Ch                 | LC                  |        |          | R1, R2, R3, R5, R13, R18, R19, R20, R22, R23, R25, R28, R30, R37, R44, R47, R49, R50, R53, R54 | AA, HA, MA, Mam, Man, Op, Om, LM, R   |
| SANTALACEAE   |                    |                     |        |          |  |   |
| <i>Osyris lanceolata</i> Hochst. & Steud.                 | Ph                 | LC                  |        |          | R49, R54, R56  | Ms oceanic, AA (Ifni mountains), HA, MA, Mam, Man, Om, LM, R  |

TABLE 2. Cont.

| Division, Families and Species                      | Life form spectrum | Assessment Criteria | Rarity | Endemism | Occurrence in the study area (relevés see table 2 and Fig. 3) | Geographic distribution in Morocco  |
|---|--------------------|---------------------|--------|----------|---|---|
| SCROPHULARACEAE<br><i>Verbascum sinuatum</i> L.     | Th                 | LC                  |        |          | R18, R19, R37   | All geographic divisions except Ms  |
| SOLANACEAE<br><i>Mandragora autumnalis</i> Bertol.  | G                  | LC                  |        |          | R4, R11   | Mam, Man, LM, R   |
| <i>Solanum nigrum</i> L.                            | Th                 | LC                  |        |          | R18, R23, R28, R40, R53                                       | AA, HA, MA, Mam, Man, Op, Om, LM, R   |
| <i>Solanum villosum</i> Mill.                       | Th                 | LC                  |        |          | R47   | Ms oceanic, HA Mam, Man, Om (Bni ,Shassène), LM, R                                    |
| <i>Withania frutescens</i> (L.) Pauquy.             | Ph                 | LC                  |        |          | R4, R5, R38   | All geographic divisions  |
| TAMARICACEAE<br><i>Tamarix africana</i> Poiret      | Ph                 | LC                  |        |          | R42   | Ms, HA, MA, Mam, Man, R   |
| THYMELAEACEAE<br><i>Daphne gnidium</i> L.           | Ch                 | LC                  |        |          | R5, R6, R7, R8, R10, R12, R16, R19, R20, R28, R37, R48        | All geographic divisions  |
| <i>Thymelaea salsa</i> Murb.                        | Th                 | LC                  | EIA    |          | R43, R48  | AA (Idd-ou-Gnidif), HA, MA, Mam (Tadla; around Boujaâd; Bni Moussa), Man, Op?, LM? R? |
| URTICACEAE<br><i>Parietaria mauritanica</i> Durieu. | Th                 | LC                  |        |          | R14, R15, R16, R29, R39, R52                                  | AA, HA, MA, Mam, Man, Om, LM, R   |
| <i>Urtica membranacea</i> Poir.                     | Th                 | LC                  |        |          | R39   | HA, MA, Mam, Man, Op, Om, LM, R   |
| <i>Urtica pilulifera</i> L.                         | Th                 | LC                  |        |          | R39   | HA, MA, Mam, Man, Op, Om, LM, R   |
| <i>Urtica urens</i> L.                              | Th                 | LC                  |        |          | R39   | As, HA, MA, Mam, Man, Op, Om, LM, R   |
| VERBENACEAE<br><i>Verbena officinalis</i> L.        | Ch                 | LC                  |        |          | R4, R6, R28, R38  | Ms (Assa), AA, HA, MA, Mam, Man, Op, Om, LM, R  |

**Abbreviations: Life forms spectrum:** Ph: Phanerophyte. Ch: Chamephyte. Hem: Hemicytrophite. G: Geophyte. Th: Therophyte. **Distribution in the geographical divisions of Morocco:** Ms: Morocco. Saharan. As: Saharan Atlas. AA: Anti Atlas. HA: High Atlas. MA: Middle Atlas. Mam: Middle Atlantic Morocco. Man: North Atlantic Morocco. Op: Eastern Morocco plateaus. Om: Mountains of eastern Morocco. LM: Mediterranean coastline. R: Rif. **Endemism:** E: endemic to Morocco. EI: endemic to Morocco and the Iberian Peninsula. EA: endemic to Morocco and Algeria. EIA: endemic to Morocco Algeria and the Iberian Peninsula. EM: endemic to Morocco and Mauritania. EC: endemic to Morocco and the Canary Islands. For rarity we based ourselves on the catalog of rare, threatened, or endemic vascular plants of Morocco (Femane and Ibn Tattou, 1998). **Rarity:** R? Suspected rare in Morocco. R: Rare in Morocco. **RR:** Very rare in Morocco.?? Extinct or of doubtful presence. **Conservation Status:** DD: Data Deficient. LC: Least Concern (low risk of extinction). NA: Not applicable. CR: Critically endangered. EN: Endangered. VU: Vulnerable. NT: Near Threatened (near the threshold of the threatened categories or may be threatened if conservation measures are not taken).

**TABLE 3. Summary of floristic diversity of the Zerhoun region, Morocco**

|          | Pteridophytes |      | Gymnospermae |      | Angiospermae |       | Total |
|----------|---------------|------|--------------|------|--------------|-------|-------|
|          | Number        | %    | Number       | %    | Number       | %     |       |
| Families | 4             | 5,97 | 1            | 1.49 | 62           | 92.54 | 67    |
| Genres   | 4             | 1.55 | 1            | 0.4  | 252          | 98.05 | 257   |
| Species  | 6             | 1.47 | 1            | 0.24 | 400          | 98.28 | 407   |

The listed taxa (species and subspecies) in this study (407 taxa) represented about 7.81% of the total vascular flora of Morocco (Fannane & Ibn Tattou, 2012; Dobignard & Chatelain, 2013); their genera (257) represent 26.19% and their families represent 43.22% (Table 4).

The life form spectrum and the percentages of the total life forms found in this study are shown in Fig. 4. In this study, five different life forms were recorded: Therophytes (201 taxa, corresponding to 49.39% of the total inventoried flora), hemicryptophytes (66 taxa, 16.21%), phanerophytes (51 taxa, 12.53%), geophytes (46 taxa, 11.3%), and chamaephytes (43 taxa, 10.57%).

#### Floristic Notes

The field surveys conducted during this study allowed the discovery of several floristic novelties or confirmations for North Atlantic Morocco (Man) representing 16 taxa: *Bromus madritensis*, *Pistacia saportae*, *Bunium atlanticum*, *Thapsia meoides*, *Scorzoneroideis muelleri*, *Tragopogon dubius*, *Lithodora fruticosa*, *Alyssum alyssoides*, *Arabis hirsuta*, *Diploxaxis tenuifolia*, *Hypericum callithyrsum.*, *Stachys saxicola* subsp. *villosissima*, *Teucrium chamaedrys*, *Rumex acetosa*, *Euphorbia dracunculoides* subsp. *glebulosa*, and *Biscutella pseudolyrata*. Of these, 14 taxa are newly recorded for the named phytogeographical division, and *Biscutella pseudolyrata*, an endemic species recently described in Morocco by Vincent et al. (2019), is newly recorded for the study area (Man-1, *sensu*

Fennane & Ibn Tattou, 1998). The occurrence of one taxon, *Euphorbia dracunculoides* subsp. *glebulosa*, which was cited as doubtful (Fennane et al., 2007) was confirmed. All of these results align with Fennane & Ibn Tattou's (2012) and Khamar et al.'s (2021, 2022) suggestion to specify the distribution of some taxa in North Atlantic Morocco.

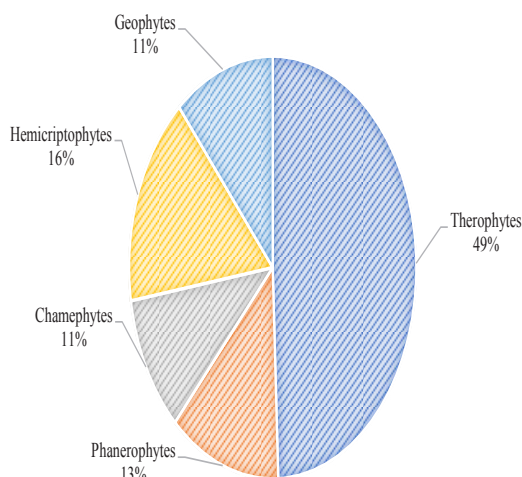
#### Extinction threats assessment

The conservation status of the inventoried flora in the study area was determined with criteria from the *Red Book of Moroccan Flora* (Fennane, 2021) and the Catalog of Endemic, Rare or Threatened Plants in Morocco (Fennane and Ibn Tattou, 1998). Of the 407 species taxa of Zerhoun, 12 (7.6%) are threatened according to IUCN Red List criteria. However, most of these are Least Concern (low risk of extinction) (376). Of the remainder, 19 (14.6%) were assessed as non-applicable (12 taxa), near-threatened (5 taxa), or data deficient (2 taxa) (Table 5).

Given that the categorization of risks was done at the national level rather than the local level, the high number of taxa listed as Least Concern does not accurately reflect the threats facing each species in the study area (Fennane, 2021). Gathering as much information as possible on the ecology, biology, geographical distribution, and environmental effects on the population dynamics of endangered plant species is one of the most effective ways to assess these species in the study area.

**TABLE 4. Comparison of floristic diversity in Zerhoun region in the present study to the floristic diversity in the entire country of Morocco**

| Location                              | Number of families | Number of genera | Number of species |
|---------------------------------------|--------------------|------------------|-------------------|
| Moulay Driss Zerhoun                  | 67                 | 257              | 407               |
| Morocco (Fennane and Ibn Tattou 2012) | 155                | 981              | 5211              |
| Percentage %                          | 43.22              | 26.19            | 7,81              |



**Fig. 4. Life form spectrum of the recorded species in Zerhoun massif region Morocco**

**TABLE 5. Number of species by threatened categories and their percentage (DD: Data Deficient. LC: Least Concern (low risk of extinction). NA: Not applicable. CR: Critically endangered. EN: Endangered. VU: Vulnerable. NT: Near Threatened (near the threshold of the threatened categories or may be threatened if conservation measures are not taken))**

| Category | Number of taxa | %     |
|----------|----------------|-------|
| CR       | 4              | 1,0%  |
| EN       | 5              | 1,2%  |
| VU       | 3              | 0,7%  |
| NT       | 5              | 1,2%  |
| DD       | 2              | 0,5%  |
| LC       | 376            | 92,4% |
| NA       | 12             | 2,9%  |

#### *Endemic taxa richness*

One of the most important factors in determining the level of floristic diversity in a region is whether or not it has any endemic species. In terms of endemism, among the 407 species inventoried in Zerhoun, 36 taxa representing 19 families are endemic (Tables 3 and 6). These strictly endemic or sub-endemic taxa, which are shared with neighboring countries, are distributed as follows: 15 taxa (44%) are strictly endemic to Morocco (E); 5 taxa (15%) are endemic to Morocco and Algeria (EA); 4 taxa (26%) are endemic to Morocco and the Iberian Peninsula (EI); 10 taxa (9%) are endemic to Morocco, Algeria, and the Iberian Peninsula (EIA); 1 taxon (3%) is endemic to Morocco and the Canary Islands (EC); and 1 taxon (3%) is commonly endemic to Morocco, Algeria, the Canary Islands,

and the Iberian Peninsula (EIAC).

#### **Discussion**

A floristic inventory is a key resource for understanding the plant diversity of a specific geographic area. It also plays an essential role in the process of formulating effective management policies to preserve a region's biodiversity.

Although Moroccan flora is among the best studied in the Mediterranean basin, there are still gaps in our understanding of it. These gaps manifest in our lack of current information about the abundance or distribution of species in different phytogeographic divisions (Fennane & Ibn Tattou, 2012; Essokne et al., 2018; Garcin, 2019; Koch & Lemmel, 2019; Vicente et al., 2019; Chatelain et al., 2020; Homrani-Bakali & Peltier, 2020; Homrani-Bakali & Susanna, 2021; Khamar et al., 2017, 2021, 2022). In reviewing the relevant literature, to date, there is no comprehensive and updated list of the plant species native to the Zerhoun region (Sauvage, 1933; Emberger, 1939). The Zerhoun region represents a very small portion of the phytogeographic sectors that comprise the North Atlantic phytogeographical region (Man, *sensu* Fennane & Ibn Tattou, 1998). Therefore, one of the more significant results of this study is the first catalog of the vascular plant species of Zerhoun, their geographical distribution, and the floristic diversity analysis.

From a floristic perspective, the richness of a region's flora is represented by the N/A ratio as it is measured in terms of the total number (N) of taxa that are present in relation to the total area (A). According to this ratio, the Zerhoun region exhibited a floristic richness of  $7.2 \times 10^{-3}$  taxa per hectare. This study affirms that the study area supports some of the richest flora of Morocco, considering its relatively small area compared to that of the country overall, as it represents about 0.07% of the total area of Morocco. The significant floristic diversity found in the Zerhoun region can be attributed, on one hand, to its transitional altitude, differences in topography (open, shallow valleys and mountains), slopes, habitat, and climatic conditions and, on the other hand, to its geographical position in a specific transition zone between the phytogeographic zones represented by the Rif Mountains in the north and the Middle Atlas Mountains in the south, as well as between the Eastern Morocco plateaus in the east and the North Atlantic region in the west.



**TABLE 6. List of endemic and rare species recorded in Zerhoun region (Abbreviations: Endemism: E: endemic to Morocco. EI: endemic to Morocco and the Iberian Peninsula. EA: endemic to Morocco and Algeria. EIA: endemic to Morocco Algeria and the Iberian Peninsula. EM: endemic to Morocco and Mauritania. EC: endemic to Morocco and the Canary Islands.?: doubtful)**

| Family          | Species  | Endemics | Rarity |
|-----------------|--|----------|--------|
| Apiaceae        | <i>Conopodium majus</i>                                  |          | RR     |
|                 | <i>Thapsia meoides</i>                                   |          | R?     |
| Asparagaceae    | <i>Modesciadium involucratum</i>                         | E        |        |
|                 | <i>Asparagus latissimus</i>                              | EA       |        |
|                 | <i>Ornithogalum umbellatum</i>                           |          | ??     |
|                 | <i>Calendula mesulii</i>                                 | E        |        |
|                 | <i>Calendula stellata</i>                                |          | R?     |
| Asteraceae      | <i>Cirsium ducellieri</i>                                | E        | RR     |
|                 | <i>Cynara humilis</i>                                    | EIAC?    |        |
|                 | <i>Filago duriaei</i>                                    | EIA      | R      |
|                 | <i>Pulicaria paludosa</i>                                | EI       |        |
| Boraginaceae    | <i>Lithodora fruticosa</i>                               |          | R      |
|                 | <i>Alyssum alyssoides</i>                                |          | R      |
|                 | <i>Arabis hirsuta</i>                                    |          | RR     |
| Brassicaceae    | <i>Biscutella pseudolyrata</i>                           | E        |        |
|                 | <i>Diplotaxis tenuifolia</i>                             |          | RR     |
|                 | <i>Diplotaxis tenuisiliqua</i>                           | EA       |        |
|                 | <i>Ceratocnemum aphanoneurum</i>                         | E        |        |
| Campanulaceae   | <i>Campanula lusitanica</i>                              | EI       |        |
|                 | <i>Feeria angustifolia</i>                               | E        |        |
| Caprifoliaceae  | <i>Valeriana macrosiphon</i>                             | EIA      |        |
|                 | <i>Dianthus lusitanus</i>                                | EIA      |        |
| Caryophyllaceae | <i>Dianthus sylvestris</i> subsp. <i>longibracteatus</i> | E        | R      |
|                 | <i>Herniaria hirsuta</i>                                 |          | R      |
| Convolvulaceae  | <i>Convolvulus sabatius</i> Subsp. <i>mauritanicus</i>   | EA       |        |
|                 | <i>Sedum wilczekianum</i>                                | E        | RR     |
| Crassulaceae    | <i>Sedum modestum</i>                                    | E        |        |
|                 | <i>Sedum mucizonia</i>                                   | EIA      |        |
| Euphorbiaceae   | <i>Euphorbia segetalis</i>                               |          | RR     |
|                 | <i>Coronilla viminalis</i>                               | EC       |        |
| Fabaceae        | <i>Ononis jahandiezii</i>                                | E        | RR     |
|                 | <i>Ononis thomsonii</i>                                  | E        |        |
| Gentianaceae    | <i>Erodium alnifolium</i>                                |          | RR     |
| Hypericaceae    | <i>Hypericum callithyrsum</i>                            | EI       | RR     |
| Iridaceae       | <i>Romulea columnae</i> .                                |          | RR     |
|                 | <i>Origanum compactum</i>                                | EI       |        |
|                 | <i>Stachys saxicola</i> subsp. <i>villosissima</i>       | E        | RR     |
| Laniaceae       | <i>Teucrium barbarum</i>                                 | E        | R      |
|                 | <i>Teucrium decipiens</i>                                | E        |        |
|                 | <i>Thymus bleicherianus</i>                              | EA?      | RR     |
| Liliaceae       | <i>Gagea durieui</i>                                     | EIA      |        |
| Linaceae        | <i>Linum tenue</i>                                       | EIA      |        |
| Malvaceae       | <i>Malva hispanica</i>                                   | EIA      |        |
| Orchidaceae     | <i>Ophrys fusca</i> subsp. <i>durieui</i> (Rechb.f.) Soó |          | RR     |
| Papaveraceae    | <i>Rupicapnos africana</i>                               | EIA      |        |
|                 | <i>Chaenorhinum villosum</i>                             | EIA      |        |
| Plantaginaceae  | <i>Linaria tristis</i> subsp. <i>pectinata</i>           | E        | R      |
| Polypodiaceae   | <i>Polypodium vulgare</i>                                |          | RR     |
| Rubiaceae       | <i>Galium bourgaeaeanum</i>                              | EA       |        |
| Thymelaeaceae   | <i>Thymelaea salsa</i>                                   | EIA      |        |



Regarding the life form spectrum, the Zerhoun flora is grouped into five life forms (therophytes, hemicryptophytes, phanerophytes, geophytes, and chamaephytes). The diversity in plant life forms in this region and the dominance of therophytes indicate their adaptation to Mediterranean environmental conditions (Taleb & Fennane, 2018). These results align with those obtained from other studies conducted around Morocco (Benkhniqie et al., 2022, 2023; Radi et al., 2022). Furthermore, therophyte plants are well-known for their significant tolerance to arid conditions and low average rainfall as they spend their vegetative cycle in a seed-bearing state.

### **Conclusions**

This study focused on generating a floristic inventory of the Zerhoun region, Morocco, which is only a small part of the different regions that constitute the North Atlantic phytogeographical region (Man, *sensu* Fennane and Ibn Tattou, 1998). The number of vascular plants encountered represented 407 taxa belonging to 257 genera in 67 families and were identified and classified to the lowest possible taxon. The presence of 4 families of pteridophytes, 1 family of gymnosperms, and 62 families of angiosperms were recorded. Among the identified families, Asteraceae is the most predominant, followed by Fabaceae, Poaceae, Lamiaceae, Apiaceae, Caryophyllaceae, Rubiaceae, Brassicaceae, Geraniaceae, and Asparagaceae. Of the 257 total genera, *Trifolium* and *Teucrium* represented the most species with 8 and 7, respectively. As a result of the exhaustive fieldwork conducted for this study, 16 species belonging to 10 families were reported as new additions to the study area. In terms of endemism, of the 407 inventoried plant taxa, 36 taxa representing 19 families were endemic. Regarding the life form spectrum, therophytes account for 49.39% of all plant taxa identified and are the most common life form in the Zerhoun region, followed by hemicryptophytes, phanerophytes, and, finally, geophytes and chamaephytes.

This inventory of the Zerhoun region's floristic composition grants us a better understanding of the biogeographic distribution of Zerhoun's reported (Fennane and Ibn Tattou, 2005) and newly-recorded species. Furthermore, the extensive dataset that was generated not only establishes a framework for future research but also can serve as a general baseline for developing

conservation action plans commensurate with the environmental sustainability of the region.

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## دراسة التنوع النباتي في منطقة مولاي إدريس زرهون في مقدمة الريف، المغرب

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بيانات تنوع النباتات في منطقة زرهون في المغرب قديمة ومجزأة. تهدف هذه الدراسة إلى توثيق تركيبة النباتات في المنطقة وتحديث القائمة من النباتات البرية الموجودة. في المجموع، تم مسح 57 جناحًا بمساحة 400 متر مربع (20 مترًا × 20 مترًا) لتقييم تكوينها الزهري الذي يمثل تنوع الغطاء النباتي في منطقة الدراسة. في المجموع، تم تسجيل 407 نوعًا (نوعًا ونوعًا فرعيًا) من الفلورة الوعائية، وهو ما يمثل 257 جنسًا في 67 عائلة، منها 16 نوعًا موزعة على 10 عائلات اضافات جديدة لنبات زرهون. العائلات الأكثر شيوعًا هي المركبات (Asteraceae) والفوليات (Fabaceae) والنجيليات (Poaceae) والشفويات (Lamiaceae) والقصبريات (Apiaceae) و القرنفليات (Caryophyllaceae) والفويات (Rubiaceae) و اللفتيات (Brassicaceae) والغرنوقيات (Geraniaceae) والهليونيات (Asparagaceae) من إجمالي 257 جنسًا، ينتمي أكبر عدد من الأنواع إلى النفل *Trifolium* والعود الأبيض *Teucrium*. كانت الحوليات (Therophytes) والشبه مختبئة (Hemicryptophytes) والظاهرية (Phanerophytes) هي الأنواع البيولوجية الأكثر شيوعًا. القائمة المحدثة لنباتات زرهون ستكون بمثابة الأساس للبحث المستقبلي وخط الأساس العام لوضع خطط عمل مناسبة لحفظ للاستدامة البيئية للمنطقة.