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# Phytodiversity and Phytogeography of the *Artemisia herba alba* Asso Steppes in Saida Region (Western Algeria)

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**ABSTRACT**

The *Artemisia herba alba* formations are among the most widespread steppe formations in Algeria. Such as the other steppe formations, these steppes are exposed to the problems of degradation, particularly the overgrazing and the clearing. Our objective is to characterize the floristic composition of steppe formations based on the *Artemisia herba alba* through the steppe zones of the Saida region.
The methodology adopted is based on a floristic inventory by floristic surveys achieved in seven stations selected in the study area. The floristic inventory was conducted during the period of optimal vegetation development in April 2015.
The results show an important floristic richness of the *Artemisia herba alba* steppe, characterized by the dominance of the therophytes (62%**)** in the biological spectrum. The biogeographical spectrum is dominated by Mediterranean elements **(**47%**)**, the floristic list obtained from the 63 surveys includes 24 families, 65 Genus and 77 botanical species, both families of the Asteraceae and Poacceae are the most dominant in all the stations.
**KEY WORDS:** *Artemisia herba alba* steppes, degradation, floristic inventory, floristic richness.

## 1. INTRODUCTION

The problem of the loss of biodiversity affects all parts of the world. Indeed, with the current pace of their exploitation and eradication, thousands of plant species are exposed to the problems of extinction. This loss of biodiversity over time has a catastrophic impact on the functioning of ecosystems. The fragmentation and loss of natural habitats, Overexploitation of natural resources, land clearing and pollution are the main reasons of the loss of biodiversity.

A proper assessment of biodiversity in a region is important for examining many questions in ecology as well as for the development of actions for biodiversity conservation **[1]**. Within this framework, this work has for objective the study of the floristic diversity of the *Artemisia herba alba* steppe in the Saida region (west of Algeria), in order to protect and ensure long-term protection and maintaining local plant biodiversity.

In Algeria, the steppe ecosystem is exposed to the danger of desertification, this fragile ecosystem is subjected to a recurrent drought and an increasing anthropic pressure: overgrazing, land clearing since several years, it knows a degradation increasingly pronounced of all components. This degradation generally is reflected by the decrease of the biological potential and by the perturbation of the ecological and socioeconomic balance **[2].**

The steppe zones of Saida region, such as other steppe regions in Algeria, live an ecological imbalance continuous resulting often from the permanent degradation, caused by the anarchic exploitation and irrational of natural resources such as overgrazing, land clearing combined with the hardness of the climate **[3, 4]**. This has consequences the reduction of vegetation cover, soil erosion and especially the decrease of biodiversity.

This contribution concerns the systematic inventory of herbaceous vegetation of the *Artemisia herba alba* steppe, as well as their biogeographic and biological significance. One of the aims of this study is also to promote the sustainable management and rational exploitation of this ecosystem, to protect this capital of natural resources against any degradation caused by their irrational uses, practices particularly frequent in North Africa **[5].** These objectives are in compliance with the first article of the Convention on Biological Diversity on "... the preservation of biodiversity and sustainable utilization of natural resources, the equitable sharing of benefits resulting from the use of biological Genetic resources ... ". To achieve these objectives, it is of paramount importance to carry out inventories to evaluate the biological potential of this ecosystem.

## 2. MATERIAL AND METHODS

### 2.1 Presentation of the Study Area

The study area as shown in figure 1, is located between 0˚and 1˚of longitude and 34˚and 35˚of latitude in the western part of the north-west of Algeria, distinguished by a very important area of steppe rangelands. It is characterized by a topography of monotonous plain marked by depressions, the elevations are between 940 m

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and 1340 m, and presented in a general a class of slopes between 0 and 3% characterizing all of the lands of the region.

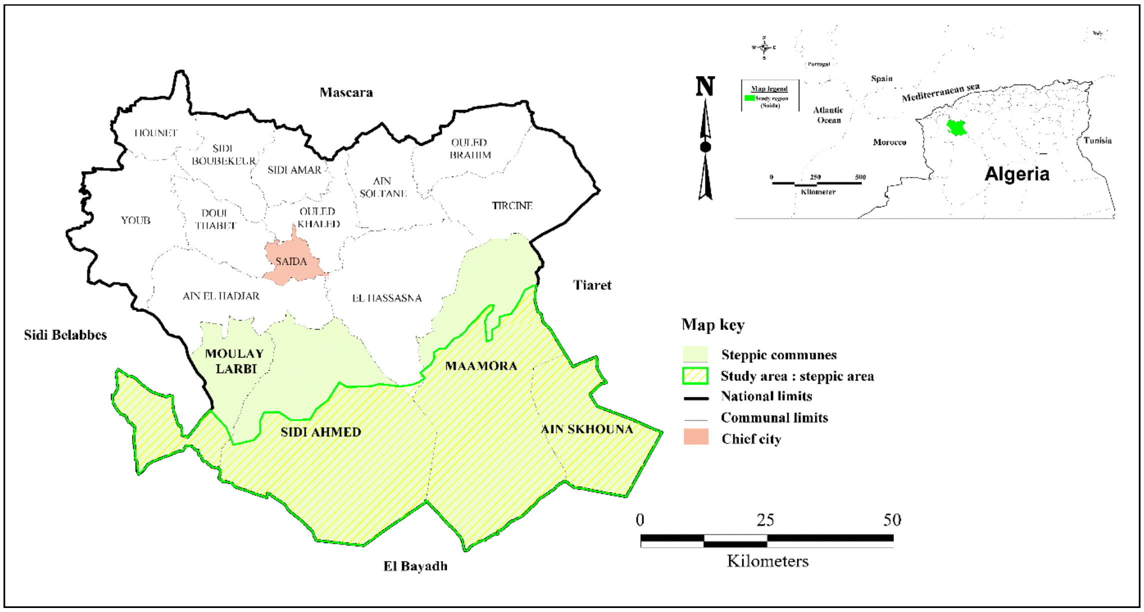


**Figure 1:** Study area delimitation

The analysis of the climate data from the period 1983-2013 **[6]** shows that the study area is marked by a dry climate to winter fresh, the annual average precipitation oscillates around 185 mm with a seasonal rainfall regime of type (winter-sprinter-autumn-summer), and the monthly temperatures are between 6.3 and 27.1 degrees Celsius. The drought period exceeds eight months.

**2.2 methodology**

Seven study stations were selected for our investigations. A systematic sampling was carried out at the stations of the study area. To meet the objectives of the study, nine phytoecological surveys have been made in each station, with a minimum area of 100 m$^2$ **[7]**. The surveys include the floristic data and the environmental conditions. Gross floristic tables have been established for the floristic characterization of vegetation. We have drawn up lists as exhaustive as possible of plant taxa.

The biogeographic characterization of species is the result of a work of synthesis referring to the information provided by the following floras: new flora of Algeria and southern desert regions **[8]**, flora and vegetation of the Sahara **[9]**. We used the biological spectrum sensu Raunkiaer **[10]** which allows to better understand the adaptation strategies of the flora as a whole to the conditions of the environment and more particularly to the climatic conditions **[11]**. This species classification is based on the position of the renovation buds by report to the soil. Five main life forms, or biological types, are taken in consideration in this study (therophytes, hemicryptophytes, geophytes, chamephytes and phanerophytes).

## 3. RESULTS AND DISCUSSION

***The floristic richness***

Le Houérou **[12]** wrote : "It is quite evident to those who have traveled through the steppes that their apparent homogeneity hides a great heterogeneity in detail, which cannot be explained simply by the zonal and systematic variation of the climate aridity or by the severity of winter temperatures ".

According to Aidoud **[13]**, the floristic richness in the arid zone depends mainly on the annual species, the environmental conditions and the combination of all the characteristics (climate, edaphic conditions and exploitation). The floristic richness is a notion that accounts for the diversity of the flora, that is to say; the number of taxa inventoried, in the station examined; in the general theory of biological diversity, developed by the British ecologist Hill, is the number of zero-order diversity. The floristic richness does not imply any judgment of value on the production or the potentialities of the vegetation; In other words, the floristic richness is independent of the richness of the vegetation [**14]**.

This classification classifies the floristic richness in the following order:

- rarefied, when it has less than 5 species;
- very poor, between 6 and 10 species;
- poor, between 11 and 20 species;
- average, between 21 and 30 species;
- rich enough, between 31 and 40 species;
- rich, between 41 and 50 species;

- very rich, between 51 and 75 species;
- particularly rich, above 75 species.

The established floristic lists were compiled from the surveys carried out at the sampling stations. The floristic analysis of the study area makes it possible to count 77 species (table. 2) distributed over the study area. Referring to the classification of Daget and Poissonet [**14**], we can say that the stations studied present a floristic richness between medium and rich (figure. 2). Thus, our contribution to the study of the *Artemisia herba alba* steppes through the steppe zone of Saida region, emphasizes a considerable floristic richness.

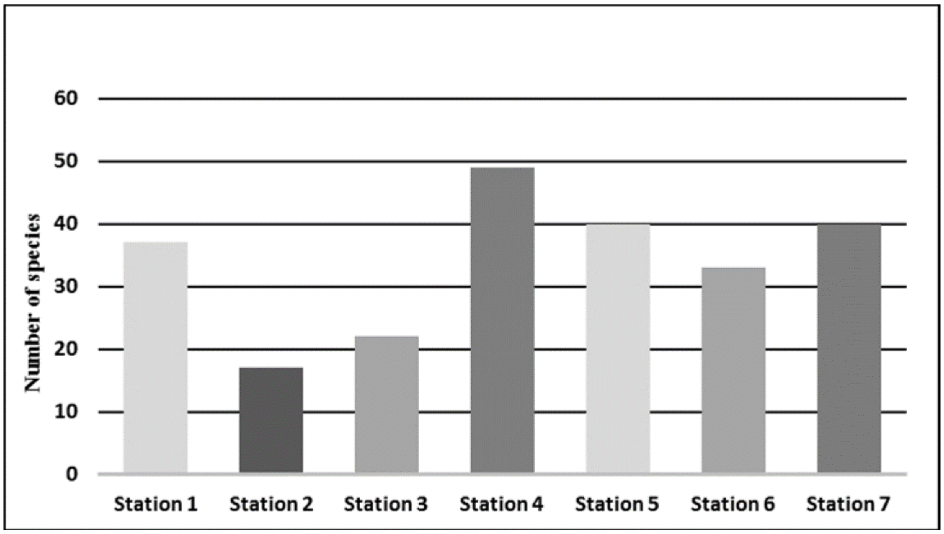


**Figure 2:** floristic richness at each station

***Systematic composition and plant biodiversity***

According to the analysis of the systematic composition of the various species inventoried in seven stations, the floristic list obtained from the 63 surveys includes 24 families, 65 Genus and 77 botanical species (table. 1), both the families of Asteraceae and Poacceae are the most dominant in all the stations. According to Ozenda [15], these two families adjust well to the conditions of the arid and semi-arid zones, and they are very common throughout the steppe regions and the Saharan Atals. As per to the latter author, they represent with Fabaceae until 40 % of the flora of the Saharan sector. These two families are among the richest in Genus and species in the taxonomic composition of the Ibero-Maghrebian steppe flora and are well represented in Mediterranean regions **[12].**

In the third position are the Fabaceae, which dominate, especially in stations 1, 2 and 4. It should be noted that on 24 families identified these three families (Asteraceae, Poaceae and Fabaceae) alone represent for more than 50% of the flora studied for most of the stations. Afterward the Caryophyllaceae, Boraginaceae, Cistaceae and Brassicaceae are presented with rates that fluctuate from a station to another between 2% and 13%. The other families are weakly represented with a rate that does not exceed 5%, except for the Amaranthaceae, which has a rate of 10 in the station 7 (most of the species of this family are Halophile), this is justified by the location of this station on the edge of the Chott (great depression of accumulation of endoreic waters).

**Table 1:** Botanical families listed in the study area

| Families | Genus | Spieces | Families | Genus | Spieces |
|---|---|---|---|---|---|
| ***Asteraceae*** | 15 | 18 | *Orobanchaceae* | 1 | 1 |
| ***Poaceae*** | 9 | 10 | *Euphorbiaceae* | 1 | 1 |
| ***Fabaceae*** | 4 | 6 | *Ranunculaceae* | 1 | 1 |
| ***Caryophyllaceae*** | 6 | 6 | *Plumbaginaceae* | 1 | 1 |
| ***Boraginaceae*** | 4 | 6 | *Nitrariaceae* | 1 | 1 |
| ***Cistaceae*** | 1 | 4 | *Malvaceae* | 1 | 1 |
| ***Brassicaceae*** | 4 | 4 | *Aizooaceae* | 1 | 1 |
| ***Amaranthaceae*** | 3 | 4 | *Iridaceae* | 1 | 1 |
| ***Lamiaceae*** | 2 | 2 | *Santalaceae* | 1 | 1 |
| ***Apiaceae*** | 2 | 2 | *Caprifoliaceae* | 2 | 2 |
| ***Thymelaeaceae*** | 1 | 1 | *Geraniaceae* | 1 | 1 |
| ***Xanthorrhoeaceae*** | 1 | 1 | *Plantaginaceae* | 1 | 1 |
| **Total Families : 24** | | | | | |
| **Total Genus : 65** | | | | | |
| **Total Spieces : 77** | | | | | |

***The biological types***

The coexistence of many biological types in the same region undoubtedly accentuates a stationary floristic richness, the proportion of the various biological types very often reflects the degree of evolution of a grouping within a series of vegetation. Depending on environmental conditions, a biological type often takes precedence over others **[16, 17]**. In addition, the analysis of the biological spectrum of the study area exposed in the figure 3, shows a clear dominance of the therophytes with a rate of 62% (48 species) of the studied vegetation. According to several authors [**18, 19**], we attend the progressive disappearance of phanerophytes at the expense of other types such as therophytes and chamaephytes, more adapted to rigorous ecological conditions. They develop the best strategies of adaptation. The very high rate of therophytes (62%) is explained by edaphic conditions (light, shallow soil) and especially the climate of the study area (drought period very long during the year) [**20, 21**].

Aidoud **[22]** underlines that in the Algerian highlands, the increase in therophytes is related to an increasing gradient of aridity. Adding to this a big anthropic pressure exercised on this environment, Floret and Pontanier [**16**] report that more a system is influenced by man (overgrazing, cultivation), more the therophytes become important.

After the therophytes, the hemicryptophytes and the chamaephytes are positioned with similar levels (16% and 14%, respectively). The hemicryptophytes are presented with 12 species, indeed, the rates of hemicryptophytes fall in the areas where we observe a degradation of the general ecological conditions, linked to the climate and to the disturbances induced by the human action **[5]**. The chamaephytisation has for origin the phenomenon of aridisation **[10]**, the chamaephytes adapt better to summer drought and strong light illumination **[24]**. The chamaephytes with 11 species occupies the third rank. According to Dahmani **[24]**, the number of chamaephytes remains, however less important than that of therophytes and hemicryptophytes except in a clearly arid environment. Quézel **[5]** also adds that chamaephytisation is assimilated to the presence of thorny, unpalatable species abandoned by cattle (*Atractylis, Noaea*…...).

The geophytes occupy the last position and have a low rate (8%). This fit in with the remarks of Barbero and *al*. **[25]** in which the geophytes decrease and disappear in lawns and steppe areas. We note the absence of phanerophytes in all the stations. Kadi Hanifi **[20]** confirms that the phanerophytes are always relegated to the last rank of the biological types in the steppe regions.

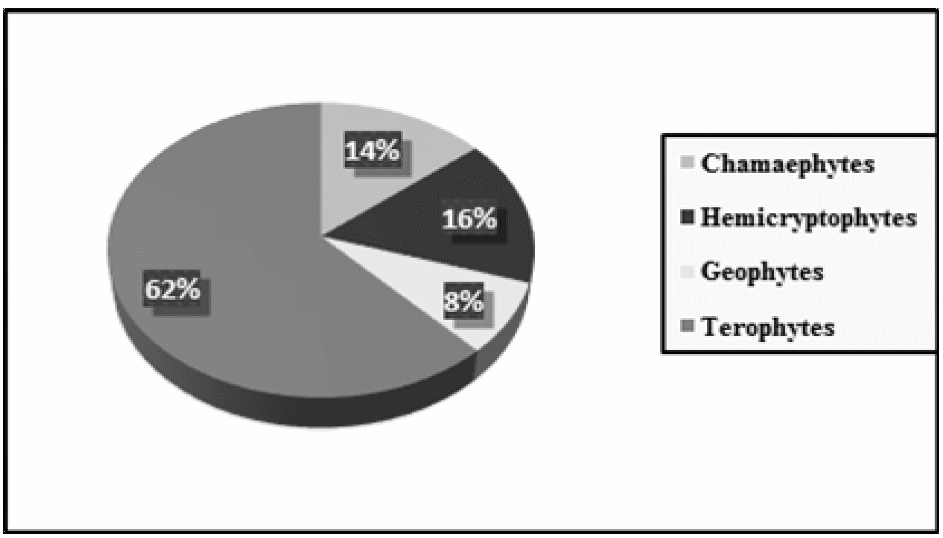


**Figure 3**: Biological Spectrum of Study Area

***Biogeographic Analysis***

The implementation of the flora of a region is due to three combined actions **[26]**: climate change, the long- distance transport by wind and birds, and the changes in the geographic model. Quézel **[27]** explained the importance of the biogeographic diversity of Mediterranean Africa by the harsh climatic changes in this region since the Miocene, which resulted in migrations of tropical flora.

<u>Mediterranean Elements</u>

The study of the overall phytogeographical spectrum of vegetation in the study area highlights the dominance of Mediterranean affinity species compared to others (figure. 4). These data confirm the integration of the studied steppes to the Mediterranean region. This is confirmed by several authors who have worked on the steppe region **[27, 28, 29, 12]**. This group constitutes the major part with thirty-six species (47%) classified in several elements according to their geographical distributions. The Elements of Mediterranean indigenous strain are the most important with fifteen species, followed by the West Mediterranean with five species, Ibero-Mauritanians: five species, Macaronesian-Mediterranean: three species, Circummediterranean: two species, Eastern Mediterranean: two species, North African: two species and the Mediterranean-Saharan with two species. Twenty two species in this group (61%) are therophytes, six species are hemichryptophyes (17%), three species are chamaephytes (8%) and five species are geophytes (14%).

*Endemic Elements*

The endemic taxa mark the study area well with eight species, that to say a rate of 10% of the Inventoried species. This order of magnitude of the endemic flora is confirmed by most of the works in the arid steppes of North Africa and Algeria **[12, 20, 21, 30]**. North African endemic species are the dominant species with five species, that's to say 62% of total endemics. The Saharan endemic elements, South Moroccan and Oro-East-Moroccan are represented by a single species each. Biologically, the therophytes and the hemicryptophytes share the same percentage (37%) of endemic taxa, followed by the chamephytes (26%).

*The Northern Elements*

The northern element plays a considerable role in the region with nine species, three species belonging to the Paleo-subtropical element, two species belonging to the Paleo-Temperate element, the following elements: Eurasian-North African, Circumboreal, North-Tropical and European-Mediterranean are represented by a single species of each. These elements represent a high rate of therophytes (89%), and 11% are geophytes.

*Species with Wide Distribution*

This group includes twelve elements composed of nineteen species, which the majority are mixed with the Mediterranean.According to Gharzouli and Djellouli [**31**], these species correspond to elements of transition between the Mediterranean group and the neighboring chorological group.

The most important element is the Mediterranean-Iranian-Turanian with four species, followed by the Saharan-Sindian with three species, the cosmopolitans with two species. The majority of the other elements are represented by only one species (the Mediterranean-Saharo-Sindian, the Mediterranean-Saharan-Iranoturanian, the Mediterranean-Asian, the Mediterranean-Atlantic, the saharo-sindian-mediterranean, the saharo-sindian-irano-touranien, The Irano-Turanian, the Irano-Turanian-European). Biologically, it is the therophytes (63%) that have the highest percentage of taxa, after the chamaephytes (11%) and hemicryptophytes (11%).

*Saharan element*

The Saharan elements are represented by three Saharan species, and two Saharan-Mediterranean species, this element denotes the aridity of the region. Composed mainly by 80% of chaméphytes and 20% of therophytes.

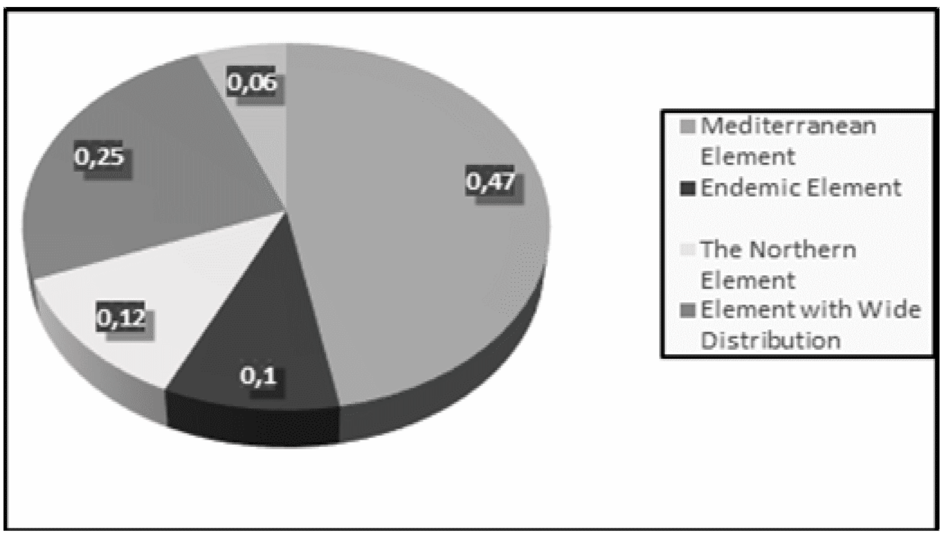


**Figure 4:** Phytogeography of the species inventoried in the Study Area

## 4. CONCLUSION

From the present work and through the floristic inventory conducted, it emerges that the *Artemisia herba aba* steppes have an important phytodiversity marked by the dominance of the annual species. This study allowed us to develop a floristic catalog and to highlight all the richness and diversity of the flora of the *Artemisia herba aba* steppes in the steppe of Saida region. The analysis of this biological diversity illustrates the role of annual species in these formations, particularly therophytes (62%).

The systematic analysis shows that the most represented families are: Asteraceae and Poacceae, the plant communities of this area are dominated by therophytes and characterized by a low representation of chamaephytes, hemicryptophytes and geophytes. Phytogeographically, the Mediterranean element is the most dominant with a rate of 47 %.

The study area has a clear scientific interest; In fact, besides the presence of numerous endemic species, it ensures the link between the Mediterranean flora of the north and the Saharan-Sindian flora of the south.

However, the dominance of therophytes and the development of unpalatable species is the consequence of the combination of climatic hazards and the anthropic pressure exerted on these ecosystems. Hence, the protection of these steppes and the creation of a reference collection for these species and the storage of their seeds is of paramount importance for their preservation.

This first analysis served to illustrate the floristic and phytogeographical interest of the *Artemisia herba alba* steppes. It deserves to be more deepened by focused studies on the dynamics of this ecosystem, the population biology of major plants and the most endangered endemic species, without forgetting the analysis of the interactions with the fauna and the study of ecological consequences of anthropogenic disturbances.

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## 6. ANNEXE

**Table 2:** Index of abundance-dominance and sociability of species in the study area

| | Species | Station 1 | Station 2 | Station 3 | Station 4 | Station 5 | Station 6 | Station 7 |
|---|---|---|---|---|---|---|---|---|
| 1 | ***Artemisia herba alba* Asso** | 2.1 | 4.1 | 3.1 | 4.1 | 3.1 | 2.1 | 2.1 |
| 2 | ***Agropyron repens*** | -- | -- | -- | +.1 | +.1 | +.1 | -- |
| 3 | ***Aizoon hispanicum*** | -- | -- | -- | -- | -- | +.1 | -- |
| 4 | ***Alyssum linifolium*** | -- | -- | +.1 | +.1 | -- | -- | -- |
| 5 | ***Anacyclus cyrtolepidioides*** | +.1 | -- | -- | +.1 | +.1 | -- | +.1 |
| 6 | ***Arnebia decumbens*** | -- | -- | -- | +.1 | -- | -- | -- |
| 7 | ***Asphodelus tenuifolius*** | -- | -- | -- | -- | +.1 | -- | -- |
| 8 | ***Astragalus cruciatus*** | +.1 | +.1 | -- | 1.1 | +.1 | +.1 | +.1 |
| 9 | ***Astragalus incanus*** | +.1 | +.1 | +.1 | +.1 | +.1 | +.1 | +.1 |
| 10 | ***Atractylis cancellata*** | -- | -- | -- | +.1 | +.1 | +.1 | +.1 |
| 11 | ***Atractylis carduus*** | -- | -- | -- | -- | +.1 | -- | +.1 |
| 12 | ***Atractylis humilis . ssp. Caespitosa*** | +.1 | -- | -- | +.1 | +.1 | +.1 | +.1 |
| 13 | ***Atractylis serratuloides*** | +.1 | -- | +.1 | -- | -- | +.1 | +.1 |
| 14 | ***Atriplex glauca*** | -- | -- | -- | -- | -- | -- | 1.1 |
| 15 | ***Atriplex halimus*** | -- | -- | -- | -- | -- | -- | 1.1 |
| 16 | ***Brachypodium Distachyum*** | -- | -- | -- | -- | +.1 | -- | -- |
| 17 | ***Bromus rubens*** | +.1 | -- | +.1 | +.1 | +.1 | 1.1 | +.1 |
| 18 | ***Bupleurum Semicompositum*** | -- | -- | -- | -- | +.1 | -- | +.1 |
| 19 | ***Carduncellus pinnatus*** | -- | -- | -- | +.1 | -- | -- | -- |
| 20 | ***Ceratocephalus falcatus*** | +.1 | -- | -- | +.1 | +.1 | +.1 | -- |
| 21 | ***Chrysanthemum coronarium*** | -- | -- | -- | -- | -- | -- | +.1 |
| 22 | ***Diplotaxis Pitardiana*** | -- | -- | -- | +.1 | -- | -- | -- |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 23 | ***Echium pycnanthum ssp. eu-pycnanthum*** | +.1 | -- | -- | +.1 | +.1 | +.1 | -- |
| 24 | ***Echium pycnanthum ssp humile*** | +.1 | +.1 | -- | +.1 | +.1 | +.1 | -- |
| 25 | ***Erodium triangulare*** | -- | -- | -- | +.1 | -- | -- | -- |
| 26 | ***Eruca vesicaria*** | -- | -- | -- | +.1 | -- | +.1 | -- |
| 27 | ***Euphorbia falcata*** | -- | -- | -- | +.1 | +.1 | +.1 | -- |
| 28 | ***Evax pygmaea*** | -- | -- | -- | -- | +.1 | -- | -- |
| 29 | ***Filago spathulata*** | +.1 | +.1 | +.1 | -- | +.1 | +.1 | +.1 |
| 30 | ***Hedypnois cretica*** | +.1 | -- | -- | +.1 | +.1 | -- | +.1 |
| 31 | ***Helianthemum apertum*** | +.1 | -- | +.1 | 1.1 | +.1 | +.1 | +.1 |
| 32 | ***Helianthemum hirtum*** | -- | -- | -- | +.1 | -- | -- | +.1 |
| 33 | ***Helianthemum pilosum*** | -- | -- | -- | +.1 | -- | -- | -- |
| 34 | ***Helianthemum virgatum*** | +.1 | -- | +.1 | +.1 | +.1 | +.1 | -- |
| 35 | ***Herniaria hirsuta*** | +.1 | +.1 | +.1 | +.1 | -- | -- | +.1 |
| 36 | ***Hordeum murinum*** | 1.1 | +.1 | +.1 | 1.1 | +.1 | +.1 | +.1 |
| 37 | ***Iris sisyrinchium*** | -- | +.1 | +.1 | +.1 | +.1 | +.1 | +.1 |
| 38 | ***Koelpinia linearis*** | -- | -- | -- | -- | -- | -- | +.1 |
| 39 | ***Koeleria pubescens*** | +.1 | -- | -- | +.1 | +.1 | +.1 | -- |
| 40 | ***Lappula Redowskii*** | -- | -- | -- | +.1 | -- | -- | -- |
| 41 | ***Lappula spinocarpos*** | +.1 | -- | -- | +.1 | -- | +.1 | -- |
| 42 | ***Launea nudicaulis*** | +.1 | -- | -- | +.1 | +.1 | -- | +.1 |
| 43 | ***Leontodon hispidulus*** | -- | -- | -- | -- | -- | -- | +.1 |
| 44 | ***Limonium echioides*** | +.1 | -- | -- | +.1 | +.1 | -- | -- |
| 45 | ***Lomelosia stellata*** | +.1 | -- | -- | -- | -- | -- | -- |
| 46 | ***Lotus creticus*** | -- | -- | -- | +.1 | -- | -- | -- |
| 47 | ***Lygeum spartum*** | +.1 | +.1 | +.1 | -- | +.1 | -- | +.1 |
| 48 | ***Malva aegyptiaca*** | +.1 | +.1 | -- | +.1 | +.1 | +.1 | -- |
| 49 | ***Medicago minima*** | +.1 | -- | +.1 | +.1 | 1.1 | +.1 | +.1 |
| 50 | ***Medicago truncatula*** | -- | -- | -- | +.1 | +.1 | -- | -- |
| 51 | ***Micropus bombycinus*** | +.1 | +.1 | -- | +.1 | +.1 | +.1 | -- |
| 52 | ***Minuartia campestris*** | -- | -- | -- | +.1 | +.1 | +.1 | -- |
| 53 | ***Muricaria prostrata*** | +.1 | -- | +.1 | +.1 | +.1 | +.1 | +.1 |
| 54 | ***Noaea mucronata*** | +.1 | +.1 | +.1 | -- | +.1 | +.1 | +.1 |
| 55 | ***Nonnea micrantha*** | +.1 | -- | -- | +.1 | -- | -- | -- |
| 56 | ***Onopordon arenarium*** | -- | -- | -- | +.1 | -- | -- | +.1 |
| 57 | ***Orobanche levis*** | -- | +.1 | +.1 | +.1 | -- | -- | -- |
| 58 | ***Paronychia arabica*** | -- | +.1 | -- | -- | +.1 | +.1 | +.1 |
| 59 | ***Peganum harmala*** | +.1 | -- | -- | -- | -- | -- | +.1 |
| 60 | ***Plantago albicans*** | +.1 | -- | +.1 | +.1 | +.1 | -- | +.1 |
| 61 | ***Poa bulbosa*** | +.1 | -- | +.1 | +.1 | -- | +.1 | -- |
| 62 | ***Salsola vermiculata*** | -- | -- | -- | -- | -- | -- | +.1 |
| 63 | ***Salvia verbenaca*** | +.1 | -- | +.1 | +.1 | +.1 | +.1 | +.1 |
| 64 | ***Scabiosa arenaria*** | -- | -- | -- | -- | -- | -- | +.1 |
| 65 | ***Schismus barbatus*** | +.1 | +.1 | +.1 | +.1 | +.1 | 1.1 | +.1 |
| 66 | ***Senicio gallicus*** | -- | -- | -- | +.1 | -- | -- | -- |
| 67 | ***Silene setacea*** | -- | -- | -- | -- | +.1 | +.1 | -- |
| 68 | ***Silybum marianum*** | -- | -- | -- | -- | -- | -- | +.1 |
| 69 | ***Spergularia diandra*** | -- | -- | -- | -- | -- | +.1 | -- |
| 70 | ***Stipa parviflora*** | +.1 | +.1 | +.1 | +.1 | +.1 | -- | +.1 |
| 71 | ***Stipa tenacissima*** | 1.1 | -- | -- | -- | -- | -- | -- |
| 72 | ***Suaeda fruticosa*** | -- | -- | -- | -- | -- | -- | +.1 |
| 73 | ***Thapsia garganica*** | +.1 | +.1 | -- | +.1 | -- | -- | -- |
| 74 | ***Thesium mauritancum*** | -- | -- | -- | -- | -- | -- | +.1 |
| 75 | ***Thymeleae microphylla*** | -- | -- | 1.1 | -- | -- | -- | +.1 |
| 76 | ***Thymus ciliatus*** | -- | -- | -- | -- | +.1 | -- | -- |
| 77 | ***Trigonella polycerata*** | +.1 | -- | -- | +.1 | -- | -- | -- |