

## Floristic Study of Sedrores Mountains in Gharyan District – Libya

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### ABSTRACT

A floristic survey of Sedrores Al-Qawasim mountains in Gharyan district - Libya was conducted in two consecutive growing seasons from 01/04/2018 to 01/6/2019. In this study area, a total number of 320 plant species belonging to 214 genera were collected representing 44 families, of which 39 families and 276 species belonging to dicotyledons, and 5 families and 44 species are belonging to monocotyledons. The results showed the dominance of the family Asteraceae with 60 species, followed by the family Fabaceae with 32 species, then the family Poaceae with 29 species. The results showed the dominance of the (Euphorbia genus) with 7 species, followed by Helianthemum, Plantago and Erodium with 6 species each. Moreover, life-form spectrum analysis showed the predominance of therophytes with 210, followed by Hemicyptophytes with 59 species, while chorotype spectrum analysis showed the dominance of Mediterranean species with 151 species, followed by Mediterrean/Iranu-Turanean with 72 species.

**Keyword:** Floristic study, vegetal diversity, Life-forms, Gharyan

### INTRODUCTION

Floristic studies are taxonomic investigations of flora or of a major part of a flora, of a given area that includes identification, nomenclature, and documentation of plant species (Keith, 1988; Ilyas et al., 2013). Moreover, Floristic lists resulting from these studies are often the only source of botanical information of a particular area and could serve as basis for more detailed studies. For instance, in ecological studies, can be used for comparison of flora in different habitats, or that of the same habitat at different times (Keith, 1988; Ferreira et al., 2013; Martínez-Calderón et al., 2017; Bano et al., 2017).

In recent times, taxonomy and floristic studies of different ecosystems including mountains have also become vital in addressing biodiversity conservation challenges in effort to meet the requirements of the Convention on Biological Diversity (CBD) (Heywood, 2004). In this respect, their primary importance lies in understanding biodiversity and the functioning of ecosystems, because it provides researchers with data to explore and describe biodiversity through scientific analysis. The aim of this study is carry out a through and detailed analysis on the vegetation of the Sedrores Mountain and Wadi Ghan, in order to explore the spatial variation of the vegetation and to reveal the features of mountainous vegetation growing in a transitional zone between the steppe and mountain regions in Gabel Nafusa.

### MATERIAL AND METHODS

#### Study area

Sedrores Mountains are located in the northeast part of Gharyan, This study area extends to the wadi Ghan (32° 11' 43" latitude N and 13° 07' 06" longitude E) and occupies an area approximately 120 km<sup>2</sup>. It is situated about 88 km south of Tripoli and described as a transitional zone between steppe and mountain regions (Fig 1a,1b). Climatically, Gharyan region including the study area follows the Mediterranean climate which characterized by hot and dry summers with high summer temperatures. The average annual temperature is 18°C and rainfall, on average ranges between 100-300 mm annually. December and January are the wettest months while the majority of rainfall occurs in the winter season, with the rainy season

beginning in September-October and ends in March-April. In addition to the geographic and topographic variation of the region, considerable edaphic variation exists. Much of the area is covered by gravels with sandy clay subsoils at depth, also unweathered granite outcrops, zones of kaolinitic clays and areas of bleached sandy soils with compacted pan-like layers also are present (Salem & Busrewil 1980). These environmental conditions can provide considerable scope for diversity in the floristic composition, adaptive characteristics displayed by the plants, patterns of groupings of plant species and the structural features of the plant communities. Some detailed studies on the vegetation of the North part of Gharyan, were conducted by (El-Hmir & Abuhadra 2008), however, Sedrores Mountains and Wadi Ghan areas have never been investigated apart from few fragmentary and brief reports prepared by (El-Gadi 1986). In this work, an extensive and thorough floristic survey was made, covering the area of Sedrores Mountains and Wadi Ghan, Gharyan -Libya.

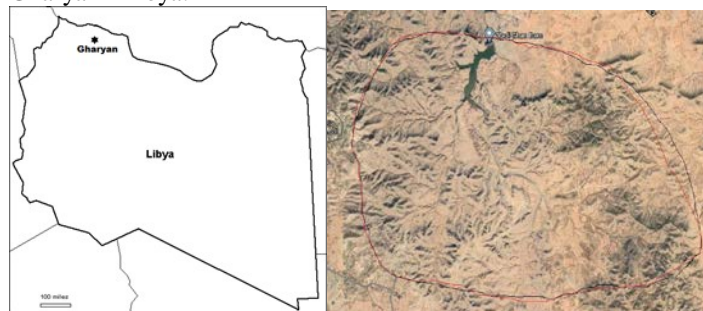


Figure 1 (a) Ghary city, Libya, (b) Study area and Sedrores Mountain

Ghary city, Libya, (b) Study area and Sedrores Mountain

Nafusa Mountains extend about 500 km (300 mi) within Libya, from the East of Alkomus city (about 60 km East of Tripoli) to the city of Wazzin at the Tunisian border in the west. The highest portion of the plateau at the Nafusa mountains including the valleys rise to over 750 m (2,500 ft) (Salem & Busrewil, 1980). Many studies indicate that the variation in plant species richness

and diversity within mountain ecosystems (Al-Aklabi et al., 2016), can be noticeably high. Nafusa mountains, with varied elevation and topography is potentially high in plant diversity as well. In spite of the long history of floristic survey in Libya, most of these studies focused on the Coastal plains and northern parts of the country, which have relatively higher vegetation diversity and abundance, whereas, floristic studies at most of the Nafusa areas are lacking, including several villages that were not included in past investigations, perhaps the most important of which is the Sedrores region. Thus, It is tempting to undertake a floristic studies within such environments. Obtaining quantitative and qualitative information for this flora and the vegetation cover is essential for assessing its potential, whether for conservation or management purposes (De Paula et al., 2017).

### Methods

A total number of 320 plant specimens were collected between 2018-2019 upon various field trips. The collected plants were then treated by the usual herbarium procedures including pressing, poisoning, mounting, labeling, and identifying. Identification of plant species was done by the authors with the aid of the following literatures (Jafri and El – Gadi, 1976-1989). Eventually, the identified plant specimens were deposited at the national herbarium, Botany Department, Faculty of Sciences, University of Gharyan. Collection of plant specimens was done by the authors.

### RESULTS

By the end of the survey, a total number of 320 different plant taxa belonging to 214 genera and 44 families, among which 39 families belong to dicotyledons with 276 species, and 5 families belong to monocotyledons with 44 species (Appendix) were recorded. The family Asteraceae showed absolute dominance with 60 species, followed by the family Fabaceae which represented by 32 species, and then the family Poaceae represented by 29 species ( Figure 2). Other families such as Brassicaceae, Boraginaceae, Lamiaceae and Apiaceae are less dominant and represented by 21, 19, 16 and 13 species respectively. Whereas, the rest of the families are represented by 10 species or less. The results of this study showed that the most dominant genera is Euphorbia which represented by 7 species, followed by Helianthemum, Erodium and Plantago with 6 species, and genera Chenopodium and Convolvulus represented by 5 species each, while the rest of the genera were represented by 4 species or less (Figure 3).

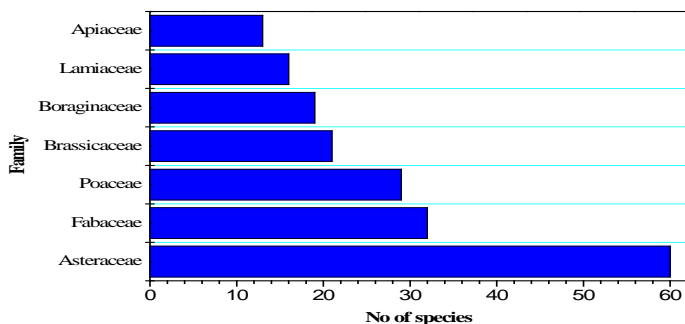


Figure 2: The most dominant families

Life-form spectrum of collected species were analyzed according to Raunkiaer system (1934) and as modified by Govaerts et al. (2000), the results showed an absolute dominance of Therophytes with 210 species, followed by Hemicryptophytes with 59 species, then Chaemephytes with 23 species, the rest of life forms were less frequent, that Geophytes with 20 species and Nanophanerophytes with only 8 species, while Phanerophytes were absent in the study area (Fig 4).

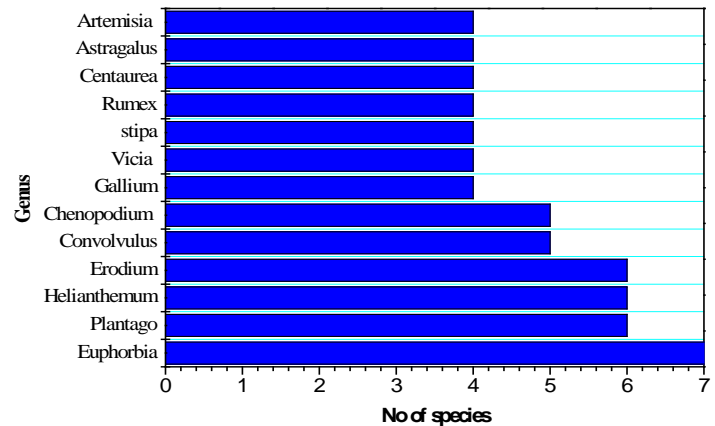


Figure 3: Dominant genera

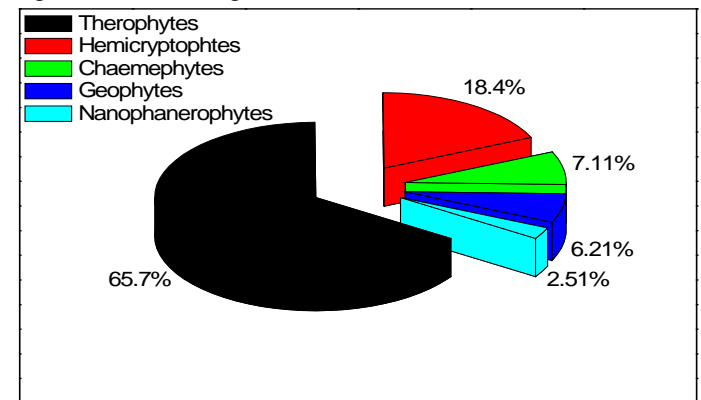


Figure 4: Lifeforms with their percentages

Table 1: Shows chorotypes with their percentages

| Chorotype                    | No of species | %    |
|------------------------------|---------------|------|
| <b>Med</b>                   | 151           | 47.1 |
| <b>Med./ Ir-Tu.</b>          | 72            | 22.5 |
| <b>Med./ Ir-Tu./ Eur-Si.</b> | 20            | 6.2  |
| <b>Plu</b>                   | 17            | 5.3  |
| <b>Sah-Ar.</b>               | 15            | 4.7  |
| <b>Med./ Eur-Si.</b>         | 11            | 3.4  |
| <b>Trop</b>                  | 8             | 2.5  |
| <b>Med./ Sah-Ar.</b>         | 8             | 2.5  |
| <b>Ir-Tu./ Sah-Ar.</b>       | 5             | 1.6  |
| <b>Sud.</b>                  | 2             | 0.6  |
| <b>Ir-Tu</b>                 | 2             | 0.6  |
| <b>Temp.</b>                 | 1             | 0.3  |
| <b>Steppe. / Sah-Arab</b>    | 1             | 0.3  |
| <b>Sah-Ar./ Ir-Tu./ Sud.</b> | 1             | 0.3  |
| <b>Med./ Ir-Tu./ Sud.</b>    | 1             | 0.3  |
| <b>Med./ Ir-Tu./ Sah-Ar.</b> | 1             | 0.3  |
| <b>Eur-Si</b>                | 1             | 0.3  |
| <b>Cos</b>                   | 1             | 0.3  |

Chorological spectrum of collected and identified plant species were analyzed as well, the results showed an absolute predominance of Mediterranean species with 151 species, followed by Med./ Ir-Tu. species with 72 species,

Then Med./ Ir-Tu./ Eur-Si species with 20 species, and Pluriregional species with 17 species, the rest of chorological spectra were less frequent as shown in (Tables 4 Appendix).

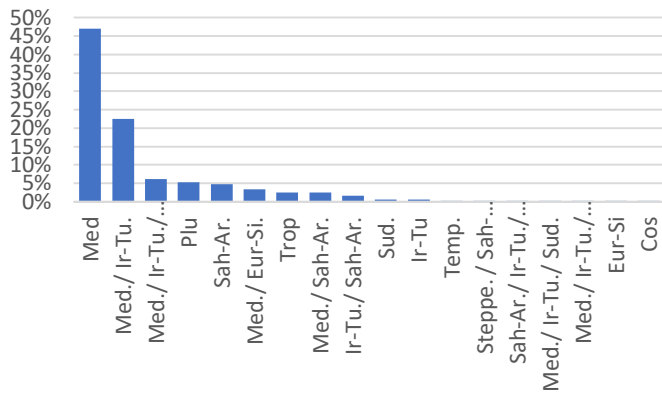


Figure 5. Shows chorotypes

## DISCUSSION

Our findings regarding the dominance of the families Asteraceae, Fabaceae and Poaceae was expected because, these families usually dominate the flora of habitats which is influenced by the Mediterranean climate conditions, in addition, these families are cosmopolitan in distribution. The dominance of Therophytes and Mediterranean chorotypes was in agreement with our expectations too because, the study area is located within the Mediterranean mountains where Therophytes normally are the most dominating life-form (Fig 4). In addition, therophytes have greater capacity for growth than other life forms, apparently because of their wider ecological amplitude, greater plasticity in size, and their small growth requirements. In addition, according to the result in (Table 1, Fig 5, appendix), there is a clear positive correlation between therophytes and Mediterranean chorotype, this explain why therophytes dominating the study area which falls within the Mediterranean region.

Moreover, one of the most characteristic features of the flora of Sedrores Mountain is the large number of families recorded, which exceeded a quarter of the total number of families in the flora of Libya. This findings indicate that the flora of Sedrores Mountain is remarkably rich, which may be attributed to its varied topography and variation in climatic conditions.

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## Appendix

Check list of recorded plant species with their life forms and chorotypes

| Family         | Name                                                | Lifeform | Chorotype             |
|----------------|-----------------------------------------------------|----------|-----------------------|
| Alliaceae      | <i>Allium ampeloprasum</i> L                        | Geo      | Med.                  |
| Alliaceae      | <i>Allium oriental</i> Boiss                        | Geo      | Med.                  |
| Alliaceae      | <i>Allium roseum</i> L                              | Geo      | Med.                  |
| Amaranthaceae  | <i>Amaranthus hybridus</i> L .                      | Th       | Trop.                 |
| Amaranthaceae  | <i>Amaranthus retroflexus</i> L                     | Th       | Med./ Eur-Si.         |
| Amaranthaceae  | <i>Amaranthus viridis</i> L                         | Th       | Trop.                 |
| Amaryllidaceae | <i>Pancreatium foetidum</i> Pomal.                  | Geo      | Med.                  |
| Anacardiceae   | <i>Pistacia atlantica</i> Desf                      | NP       | Med.                  |
| Anacardiceae   | <i>Rhus tripartita</i> (Ucria.)Grande               | NP       | Med.                  |
| Apiaceae       | <i>Ammi visnaga</i> (L.)Lam                         | Th       | Med.                  |
| Apiaceae       | <i>Bunium fontainesii</i> (Pers )Maire              | Th       | Med.                  |
| Apiaceae       | <i>Bupleurm lancifolium</i> Hornem                  | Th       | Med./ Ir-Tu.          |
| Apiaceae       | <i>Bupleurm semicompositum</i> L                    | Th       | Med./ Ir-Tu.          |
| Apiaceae       | <i>Conium maculatum</i> L                           | H        | Med./ Eur-Si.         |
| Apiaceae       | <i>Daucus capillifolius</i> Gilli                   | Th       | Med.                  |
| Apiaceae       | <i>Ferula tingitana</i> L                           | H        | Med.                  |
| Apiaceae       | <i>Malabaila suaveolens</i> (Del.)Coss              | H        | Med.                  |
| Apiaceae       | <i>Pituranthos denudatus</i> Viv.                   | Ch       | Med.                  |
| Apiaceae       | <i>Scandix pecten-veneris</i> L.                    | Th       | Med./ Eur-Si.         |
| Apiaceae       | <i>Torilis leptophylla</i> (L.)Gaertn               | Th       | Med./ Ir-Tu.          |
| Apiaceae       | <i>Torilis nodosa</i> (L.)Gaertn                    | Th       | Med./ Ir-Tu./ Eur-Si. |
| Apiaceae       | <i>Torilis tenella</i> (Del.)Reichb                 | Th       | Med.                  |
| Asclepiadaceae | <i>Caralluma europaea</i> (Guss.)N.E.Br             | H        | Med.                  |
| Asteraceae     | <i>Amberboa libyca</i> (Viv.)Alavi                  | Th       | Med.                  |
| Asteraceae     | <i>Anacyclus clavatus</i> ( Desf.)Pers.             | Th       | Med.                  |
| Asteraceae     | <i>Anacyclus monanthos</i> (L.)Thell                | Th       | Med.                  |
| Asteraceae     | <i>Andryala integrifolia</i> L                      | Th       | Med.                  |
| Asteraceae     | <i>Anthemis secundiramea</i> Biv                    | Th       | Med.                  |
| Asteraceae     | <i>Anvillea garcinii</i> (Burm.fil.)DC.Prodr        | H        | Med./ Ir-Tu.          |
| Asteraceae     | <i>Artemisa monosperma</i> Delile                   | Ch       | Med./ Sah-Ar          |
| Asteraceae     | <i>Artemisia campestris</i> L                       | Ch       | Med./ Eur-Si.         |
| Asteraceae     | <i>Artemisia herba-alba</i>                         | Ch       | Ir-Tu.                |
| Asteraceae     | <i>Asteriscus pygmaeus</i> DC.                      | Th       | Ir-Tu./ Sah-Ar.       |
| Asteraceae     | <i>Atractylis cancellata</i> L                      | Th       | Med.                  |
| Asteraceae     | <i>Atractylis carduus</i> (Forsk.) Christ in Dansk. | H        | Sah-Ar.               |
| Asteraceae     | <i>Atractylis delicatula</i> Batt. exChevall        | Th       | Med.                  |
| Asteraceae     | <i>Atractylis serratuloides</i> Sieb. ex Cass.      | H        | Sah-Ar.               |

|            |                                                             |     |                       |
|------------|-------------------------------------------------------------|-----|-----------------------|
| Asteraceae | <i>Bombycilaena discolor</i> Pers .                         | Th  | Med.                  |
| Asteraceae | <i>Calendula arvensis</i> L.                                | Th  | Med./ Ir-Tu.          |
| Asteraceae | <i>Calendula tripterocarpa</i> Rupr                         | Th  | Sah-Ar.               |
| Asteraceae | <i>Carduncellus eriocephalus</i> Boiss                      | H   | Sah-Ar.               |
| Asteraceae | <i>Carduncellus pinnatus</i> (Desf.) DC                     | H   | Med.                  |
| Asteraceae | <i>Carduus getulus</i> Pomel                                | Th  | Sah-Ar.               |
| Asteraceae | <i>Carthamus lanatus</i> L.                                 | Th  | Med./ Ir-Tu./ Eur-Si. |
| Asteraceae | <i>Centaurea alexandrina</i> Delile                         | Th  | Med.                  |
| Asteraceae | <i>Centaurea dimorpha</i> Viv.                              | H   | Med./ Ir-Tu.          |
| Asteraceae | <i>Centaurea glomerata</i> Vahl .                           | Th  | Med.                  |
| Asteraceae | <i>Centaurea maroccana</i> Ball.                            | Th  | Med.                  |
| Asteraceae | <i>Chrysanthemum segetum</i> L                              | Th  | Med./ Ir-Tu.          |
| Asteraceae | <i>Conyza bonariensis</i> L                                 | Th  | Med.                  |
| Asteraceae | <i>Crepis libyca</i> Pamp.                                  | H   | Med.                  |
| Asteraceae | <i>Crupina crupinastrum</i> (Moris) Vis.                    | Th  | Med./ Ir-Tu.          |
| Asteraceae | <i>Cynara cardunculus</i> L.                                | H   | Med.                  |
| Asteraceae | <i>Echinops galalensis</i> Schweinf.                        | H   | Med.                  |
| Asteraceae | <i>Evax libyaca</i> Alavi                                   | Th  | Med.                  |
| Asteraceae | <i>Filago desertorum</i> Pomel                              | Th  | Ir-Tu./ Sah-Ar.       |
| Asteraceae | <i>Hedypnois cretica</i> (L.) Dum.-Courset                  | Th  | Med.                  |
| Asteraceae | <i>Helichrysum stoechas</i> (L.) Moench                     | H   | Med.                  |
| Asteraceae | <i>Hyoseris scabra</i> L.                                   | Th  | Med.                  |
| Asteraceae | <i>Hypochoeris achyrophorus</i> L.                          | Th  | Med.                  |
| Asteraceae | <i>Hypochoeris glabra</i> L.                                | Th  | Med.                  |
| Asteraceae | <i>Jasonia rupestris</i> Bomel.                             | H   | Med.                  |
| Asteraceae | <i>Koelpinia linearis</i> Pallas.                           | Th  | Med./ Eur-Si.         |
| Asteraceae | <i>Launaea capitata</i> (Sprengel.) Dandy                   | H   | Sah-Ar.               |
| Asteraceae | <i>Launaea nudicaulis</i> L.                                | H   | Sah-Ar./ Ir-Tu./ Sud. |
| Asteraceae | <i>Launaea resedifolia</i> (L.) O. Kuntze                   | H   | Med.                  |
| Asteraceae | <i>Leontodon simplex</i> (Viv.) Widder                      | Th  | Med./ Eur-Si.         |
| Asteraceae | <i>Nolletia chrysocomides</i> Desf.                         | H   | Med.                  |
| Asteraceae | <i>Onopordum espinae</i> Cosson ex Bonnet                   | H   | Med.                  |
| Asteraceae | <i>Pallenis spinosa</i> (L.) Cass.                          | H   | Med./ Ir-Tu.          |
| Asteraceae | <i>Phagnalon rupestre</i> (L.) DC.                          | H   | Med./ Ir-Tu.          |
| Asteraceae | <i>Picris asplenoides</i> L.                                | Th  | Sah-Ar.               |
| Asteraceae | <i>Reichardia picroides</i> (L.) ROTH                       | H   | Med.                  |
| Asteraceae | <i>Reichardia tingitana</i> (L.) Roth                       | Th  | Ir-Tu./ Sah-Ar.       |
| Asteraceae | <i>Rhagadiolus stellatus</i> (L.) Gaertner                  | Th  | Med./ Ir-Tu.          |
| Asteraceae | <i>Rhanterium suaveolens</i> (Desf.)                        | H   | Steppe. / Sah-Arab    |
| Asteraceae | <i>Scorzonera undulata</i> Vahl                             | Geo | Med.                  |
| Asteraceae | <i>Senecio gallicus</i> Chiaux                              | Th  | Med.                  |
| Asteraceae | <i>Silybum marianum</i> (L.) Gaertner                       | Th  | Med./ Ir-Tu./ Eur-Si  |
| Asteraceae | <i>Sonchus oleraceus</i> L.                                 | Th  | Cos.                  |
| Asteraceae | <i>Tripleurospermum philaenorum</i> (Maire & Weiller) Alavi | Th  | Sah-Ar.               |

|                 |                                                        |    |                       |
|-----------------|--------------------------------------------------------|----|-----------------------|
| Asteraceae      | <i>Urospermum delachampii</i> L.                       | H  | Med.                  |
| Asteraceae      | <i>Xanthium spinosum</i> L                             | Th | Trop.                 |
| Boraginaceae    | <i>Alkanna tinctoria</i> (L.)Tausch.                   | H  | Med.                  |
| Boraginaceae    | <i>Anchusa aegyptiaca</i> (L.) DC                      | Th | Med./ Ir-Tu.          |
| Boraginaceae    | <i>Asperugo procumbens</i> L.                          | Th | Plu.                  |
| Boraginaceae    | <i>Cynoglossum cheirifolium</i> L.                     | Th | Med.                  |
| Boraginaceae    | <i>Cynoglossum clandestinum</i> Desf                   | H  | Med.                  |
| Boraginaceae    | <i>Echiochilon fruticosum</i> Desf.                    | Ch | Med.                  |
| Boraginaceae    | <i>Echium angustifolium</i> Mill.                      | H  | Med.                  |
| Boraginaceae    | <i>Echium sabulicola</i> Pomel                         | Th | Med.                  |
| Boraginaceae    | <i>Elizaldia calycina</i> Roem .                       | Th | Med.                  |
| Boraginaceae    | <i>Eritrichium pusillum</i><br>(Coss.&Dur.)Torr.etGrey | Th | Med.                  |
| Boraginaceae    | <i>Gastrocotyle hispida</i> ( Forsk.)Bunge             | Th | Med./ Ir-Tu.          |
| Boraginaceae    | <i>Heliotropium europaeum</i> L.                       | Th | Med.                  |
| Boraginaceae    | <i>Lappula spinocarpos</i> Forsk.                      | Th | Med./ Ir-Tu.          |
| Boraginaceae    | <i>Nonea viviani</i> DC                                | Th | Med.                  |
| Brassicaceae    | <i>Alyssum montanum</i> L.                             | H  | Med.                  |
| Brassicaceae    | <i>Biscutella didyma</i> L.                            | Th | Med./ Ir-Tu.          |
| Brassicaceae    | <i>Capsella bursa-pastoris</i> (L.) Medik.             | Th | Plu.                  |
| Brassicaceae    | <i>Carrichtera annua</i> (L.) DC.                      | Th | Med./ Ir-Tu./ Eur-Si. |
| Brassicaceae    | <i>Clypeola jonthlaspi</i> L.                          | Th | Med./ Ir-Tu./ Eur-Si. |
| Brassicaceae    | <i>Diplotaxis harra</i> (Forsk.)Boiss.                 | Th | Med./ Ir-Tu.          |
| Brassicaceae    | <i>Diplotaxis muralis</i> (L.) DC.                     | Th | Med./ Eur-Si.         |
| Brassicaceae    | <i>Enarthrocarpus clavatus</i> Del. ex Godr.           | Th | Med.                  |
| Brassicaceae    | <i>Eruca longirostris</i> Uechtr.                      | Th | Med.                  |
| Brassicaceae    | <i>Lobularia libyca</i> (Viv.) Meisner.                | Th | Med./ Ir-Tu.          |
| Brassicaceae    | <i>Lobularia maritima</i> L & Desv.                    | H  | Med.                  |
| Brassicaceae    | <i>Matthiola longipetala</i> (Vent.) DC.               | Th | Med./ Ir-Tu.          |
| Brassicaceae    | <i>Matthiola parviflora</i> (Schousbe.) R.Br. In Ait.  | Th | Sah-Ar.               |
| Brassicaceae    | <i>Matthiola tricuspidata</i> (L.)R.B                  | Th | Med.                  |
| Brassicaceae    | <i>Neslia apiculata</i> Fisch                          | Th | Med./ Ir-Tu.          |
| Brassicaceae    | <i>Notoceras bicornis</i> (Ait.)Caruel                 | Th | Med./ Ir-Tu.          |
| Brassicaceae    | <i>Sinapis alba</i> L.                                 | Th | Med./ Ir-Tu./ Eur-Si. |
| Brassicaceae    | <i>Sinapis pubescens</i> L.                            | Th | Med.                  |
| Brassicaceae    | <i>Sisymbrium erysimoides</i> Desf.                    | Th | Med./ Ir-Tu.          |
| Brassicaceae    | <i>Sisymbrium irio</i> L                               | Th | Med./ Ir-Tu.          |
| Brassicaceae    | <i>Torularia torusola</i> Desf.Schulz                  | Th | Med./ Ir-Tu.          |
| Capparaceae     | <i>Capparis spinosa</i> L                              | NP | Med.                  |
| Caryophyllaceae | <i>Dianthus crinitus</i> Sm                            | H  | Med./ Ir-Tu.          |
| Caryophyllaceae | <i>Gypsophila pilosa</i> Hudson                        | Th | Med.                  |
| Caryophyllaceae | <i>Minuartia geniculata</i> (Poiret.)Thell             | H  | Med.                  |
| Caryophyllaceae | <i>Silen rubella</i> Poiret                            | Th | Med.                  |
| Caryophyllaceae | <i>Silene colorata</i> Poiret.                         | Th | Med.                  |
| Caryophyllaceae | <i>Silene vulgaris</i> (Moench.)Garcke                 | H  | Med./ Ir-Tu./ Eru-Si. |

|                 |                                                    |     |                       |
|-----------------|----------------------------------------------------|-----|-----------------------|
| Caryophyllaceae | <i>Spergula falax</i> (Lowe).                      | Th  | Med./ Ir-Tu.          |
| Caryophyllaceae | <i>Vaccaria pyramidata</i> Medik                   | Th  | Med.                  |
| Chenopodiaceae  | <i>Chenopodium album</i> L.                        | Th  | Plu.                  |
| Chenopodiaceae  | <i>Chenopodium ambrosioides</i> L                  | Th  | Plu.                  |
| Chenopodiaceae  | <i>Chenopodium botrys</i> L.                       | Th  | Med./ Ir-Tu.          |
| Chenopodiaceae  | <i>Chenopodium murale</i> L                        | Th  | Plu.                  |
| Chenopodiaceae  | <i>Chenopodium vulvaria</i> L                      | Th  | Plu.                  |
| Chenopodiaceae  | <i>Hammada scoparia</i> (Pomel) Iljin              | Ch  | Med./ Ir-Tu.          |
| Chenopodiaceae  | <i>Salsola kali</i> L.                             | Th  | Plu.                  |
| Chenopodiaceae  | <i>Salsola tetrandra</i> Forsk                     | Ch  | Med./ Sah-Ar.         |
| Chenopodiaceae  | <i>Suaeda aegyptiaca</i> ( Hasselq.)               | Th  | Med./ Sah-Ar.         |
| Cistaceae       | <i>Helianthemum ciliatum</i> ( Desf.)Pers          | Ch  | Med.                  |
| Cistaceae       | <i>Helianthemum hirtum</i> L                       | Ch  | Med.                  |
| Cistaceae       | <i>Helianthemum kahircicum</i> Delile.             | Ch  | Med.                  |
| Cistaceae       | <i>Helianthemum lavandulifolium</i> Mill           | Ch  | Med./ Eur-Si.         |
| Cistaceae       | <i>Helianthemum lippii</i> (L.)Dum Cours.          | Ch  | Med.                  |
| Cistaceae       | <i>Helianthemum salicifolium</i> (L.) Mill         | Th  | Med./ Ir-Tu./ Eur-Si. |
| Convolvulaceae  | <i>Convolvulus altheoides</i> L.                   | Th  | Med.                  |
| Convolvulaceae  | <i>Convolvulus arvensis</i> L.                     | Geo | Plu.                  |
| Convolvulaceae  | <i>Convolvulus dorycnium</i> L.                    | H   | Med.                  |
| Convolvulaceae  | <i>Convolvulus oleifolius</i> Desr. in Lam.        | Ch  | Med.                  |
| Convolvulaceae  | <i>Convolvulus supinus</i> Coss.                   | Th  | Med.                  |
| Crassulaceae    | <i>Sedum sediforme</i> (Jacq.) Pau                 | H   | Med.                  |
| Crassulaceae    | <i>Umbilicus horizontalis</i> (Guss.) DC.          | H   | Med.                  |
| Cuscutaceae     | <i>Cuscuta planiflora</i> Ten.                     | Th  | Med./ Ir-Tu.          |
| Dipsacaceae     | <i>Scabiosa arenaria</i> Forsk.                    | Th  | Med.                  |
| Dipsacaceae     | <i>Scabiosa monspeliensis</i> Jacq.                | Th  | Med.                  |
| Euphorbiaceae   | <i>Chrozophora obliqua</i> (Vahl.) Juss. Ex Spreng | Th  | Med./ Ir-Tu.          |
| Euphorbiaceae   | <i>Euphorbia chamaesyce</i> L                      | Th  | Med./ Ir-Tu.          |
| Euphorbiaceae   | <i>Euphorbia falcata</i> L.                        | Th  | Trop.                 |
| Euphorbiaceae   | <i>Euphorbia helioscopia</i> L.                    | Th  | Plu.                  |
| Euphorbiaceae   | <i>Euphorbia parvula</i> Delile.                   | Th  | Med.                  |
| Euphorbiaceae   | <i>Euphorbia retusa</i> Cav                        | H   | Med./ Sah-Ar.         |
| Euphorbiaceae   | <i>Euphorbia serrata</i> L                         | H   | Med.                  |
| Euphorbiaceae   | <i>Euphorbia dracunculoides</i> Lam                | Th  | Trop.                 |
| Euphorbiaceae   | <i>Mercurialis annua</i> L                         | Th  | Trop.                 |
| Fabaceae        | <i>Anthyllis tetraphylla</i> L.                    | Th  | Med.                  |
| Fabaceae        | <i>Anthyllis vulneraria</i> L.                     | Th  | Med.                  |
| Fabaceae        | <i>Astragalus caprinus</i> L                       | H   | Med./ Ir-Tu.          |
| Fabaceae        | <i>Astragalus hamosus</i> L.                       | Th  | Med.                  |
| Fabaceae        | <i>Astragalus sinaicus</i> Boiss                   | Th  | Med./ Ir-Tu.          |
| Fabaceae        | <i>Astragalus tribuloides</i> Del.                 | Th  | Med./ Ir-Tu.          |
| Fabaceae        | <i>Calicotome villosa</i> (Poir.) Link.            | NP  | Med.                  |
| Fabaceae        | <i>Coronilla scorpioides</i> L. & Koch.            | Th  | Med.                  |

|               |                                             |     |                       |
|---------------|---------------------------------------------|-----|-----------------------|
| Fabaceae      | <i>Genista microcephala</i> Coss. & Dur.    | NP  | Med.                  |
| Fabaceae      | <i>Hedysarum spinosissimum</i> L.           | Th  | Med.                  |
| Fabaceae      | <i>Hippocrepis ciliata</i> Willd            | Th  | Med.                  |
| Fabaceae      | <i>Hippocrepis multisiliquosa</i> L.        | Th  | Med.                  |
| Fabaceae      | <i>Hymenocarpus circinatus</i> (L.) Savi.   | Th  | Med./ Ir-Tu.          |
| Fabaceae      | <i>Lathyrus cicera</i> L.                   | Th  | Med./ Ir-Tu.          |
| Fabaceae      | <i>Lotus edulis</i> L.                      | Th  | Med.                  |
| Fabaceae      | <i>Lotus glinoides</i> Del                  | Th  | Sud.                  |
| Fabaceae      | <i>Medicago minima</i> (L.)Bart.            | Th  | Med./ Ir-Tu.          |
| Fabaceae      | <i>Medicago polymorpha</i> L.               | Th  | Med./ Ir-Tu.          |
| Fabaceae      | <i>Medicago turbinata</i> (L.)All.          | Th  | Med.                  |
| Fabaceae      | <i>Melilotus sulcatus</i> Desf.             | Th  | Med.                  |
| Fabaceae      | <i>Onobrychis caput- galli</i> (L.) Lam     | Th  | Med.                  |
| Fabaceae      | <i>Ononis angustissima</i> Lam.             | Th  | Med.                  |
| Fabaceae      | <i>Ononis reclinata</i> L                   | Th  | Med./ Ir-Tu.          |
| Fabaceae      | <i>Ononis viscosa</i> L.                    | Th  | Med.                  |
| Fabaceae      | <i>Psoralea bituminosa</i> L.               | H   | Med.                  |
| Fabaceae      | <i>Retama raetam</i> (Forsk.) Webb          | NP  | Sah-Ar.               |
| Fabaceae      | <i>Scorpiurus muricatus</i> L.              | Th  | Med.                  |
| Fabaceae      | <i>Trifolium arvense</i> L                  | Th  | Med./ Ir-Tu./ Eru-Si. |
| Fabaceae      | <i>Vicia ervilia</i> (L.) Willd             | Th  | Med./ Ir-Tu.          |
| Fabaceae      | <i>Vicia monantha</i> Retz.                 | Th  | Med.                  |
| Fabaceae      | <i>Vicia sativa</i> L.                      | Th  | Med./ Ir-Tu./ Eur-Si. |
| Fabaceae      | <i>Vicia villosa</i> Roth.                  | Th  | Med./ Ir-Tu./ Eur-Si. |
| Fumariaceae   | <i>Fumaria gaillardotii</i> Boiss.          | Th  | Med.                  |
| Geraniaceae   | <i>Erodium cicutarium</i> L                 | Th  | Med.                  |
| Geraniaceae   | <i>Erodium gruinum</i> (L.)L.Herit          | Th  | Med.                  |
| Geraniaceae   | <i>Erodium hirtum</i> (Forsk.) Will.        | Th  | Sah-Ar.               |
| Geraniaceae   | <i>Erodium malacoides</i> (L.) L Her.       | Th  | Med./ Ir-Tu.          |
| Geraniaceae   | <i>Erodium moschatum</i> (L.) L Her.        | Th  | Med.                  |
| Geraniaceae   | <i>Erodium neuradifolium</i> Delile         | Th  | Med./ Ir-Tu.          |
| Geraniaceae   | <i>Geranium molle</i> L.                    | Th  | Med./ Eur-Si.         |
| Geraniaceae   | <i>Monsonia nivea</i> (Decne.)DecneexWebb   | H   | Med./ Ir-Tu./ Sah-Ar. |
| Hypeocaceae   | <i>Hypecoum pendulum</i> L.                 | Th  | Med.                  |
| Illecebraceae | <i>Gymnocarpus decander</i> Forsk.          | Ch  | Med./ Ir-Tu.          |
| Illecebraceae | <i>Herniaria cinerea</i> DC.                | Th  | Med./ Ir-Tu.          |
| Illecebraceae | <i>Herniaria fontanesii</i> J.Gay. in Duch. | H   | Med.                  |
| Illecebraceae | <i>Paronychia chlorothyrsa</i> Murb.        | H   | Sah-Ar.               |
| Illecebraceae | <i>Pteranthus dichotomus</i> Forsk          | Th  | Med./ Ir-Tu.          |
| Illecebraceae | <i>Sclerocephalus arabicus</i> Boiss        | Th  | Med./ Ir-Tu./ Sah-Ar. |
| Iridaceae     | <i>Iris sisyrinchium</i> L.                 | Geo | Med.                  |
| Lamiaceae     | <i>Ajuga iva</i> (L.) Schreber              |     | H Med./ Ir-Tu.        |
| Lamiaceae     | <i>Lamium amplexicaule</i> L.               |     | Th Med.               |
| Lamiaceae     | <i>Lavandula multifida</i> L.               |     | Ch Med./ Ir-Tu.       |
| Lamiaceae     | <i>Marrubium alysson</i> L.                 |     | H Med.                |



|                |                                                 |     |                       |
|----------------|-------------------------------------------------|-----|-----------------------|
| Lamiaceae      | <i>Marrubium vulgare</i> L.                     | H   | Med./ Ir-Tu.          |
| Lamiaceae      | <i>Micromeria nervosa</i> (Desf.) Benth.        | Ch  | Med.                  |
| Lamiaceae      | <i>Prasium majus</i> L.                         | NP  | Med.                  |
| Lamiaceae      | <i>Salvia aegyptiaca</i> L                      | Ch  | Sah-Ar.               |
| Lamiaceae      | <i>Salvia lanigera</i> Poir.                    | Th  | Med./ Ir-Tu.          |
| Lamiaceae      | <i>Salvia verbenaca</i> L.                      | Th  | Med./ Ir-Tu./ Eur-Si. |
| Lamiaceae      | <i>Satureja thymbra</i> L                       | Th  | Med.                  |
| Lamiaceae      | <i>Teucrium compactum</i> L                     | Ch  | Med.                  |
| Lamiaceae      | <i>Teucrium fruticans</i> L                     | Ch  | Med.                  |
| Lamiaceae      | <i>Teucrium polium</i> L.                       | Ch  | Med./ Ir-Tu./ Eur-Si. |
| Lamiaceae      | <i>Thymus algeriensis</i> Boiss                 | Ch  | Med.                  |
| Lamiaceae      | <i>Thymus capitatus</i> (L.) Hoffm. & Link      | Ch  | Med.                  |
| Liliaceae      | <i>Asparagus stipularis</i> Forsk.              | Geo | Med.                  |
| Liliaceae      | <i>Asphodelus fistulosus</i> L.                 | H   | Med.                  |
| Liliaceae      | <i>Asphodelus microcarpus</i> Salzm. & Viv.     | Geo | Med.                  |
| Liliaceae      | <i>Asphodelus tenuifolius</i> Cav               | H   | Med./ Ir-Tu.          |
| Liliaceae      | <i>Belvalia sessiliflora</i> (Viv.)Kunth        | Geo | Med.                  |
| Liliaceae      | <i>Dipcadi serotinum</i> (L.) Medic.            | Geo | Plu.                  |
| Liliaceae      | <i>Gagea reticulata</i> (Pall.)Schult           | Geo | Med.                  |
| Liliaceae      | <i>Muscari comosum</i> (L.) Mill.               | Geo | Med.                  |
| Liliaceae      | <i>Ornithogalum arabicum</i> L                  | Geo | Med.                  |
| Liliaceae      | <i>Scilla peruwiana</i> L.                      | Geo | Med.                  |
| Linaceae       | <i>Linum strictum</i> L.                        | Th  | Med.                  |
| Orobanchaceae  | <i>Cistanche phelypaea</i> (L.)                 | Th  | Med.                  |
| Papaveraceae   | <i>Glaucium corniculatum</i> (L.)Rud            | Th  | Med./ Ir-Tu./ Eur-Si. |
| Papaveraceae   | <i>Papaver hybridum</i> L                       | Th  | Med.                  |
| Papaveraceae   | <i>Papaver rhoeas</i> L.                        | Th  | Med./ Ir-Tu.          |
| Papaveraceae   | <i>Roemeria hybrida</i> (L.)DC                  | Th  | Med.                  |
| Plantaginaceae | <i>Plantago albicans</i> L .                    | H   | Med./ Ir-Tu.          |
| Plantaginaceae | <i>Plantago amplexicaulis</i> Cav.              | Th  | Med./ Ir-Tu.          |
| Plantaginaceae | <i>Plantago arenaria</i> Walds.t & Kit.         | Th  | Med./ Ir-Tu./ Eur-Si. |
| Plantaginaceae | <i>Plantago coronopus</i> L                     | Th  | Med./ Ir-Tu.          |
| Plantaginaceae | <i>Plantago lagopus</i> L                       | Th  | Med./ Ir-Tu./ Eur-Si. |
| Plantaginaceae | <i>Plantago ovata</i> Forskal                   | H   | Med./ Ir-Tu.          |
| Poaceae        | <i>Aegilops Kotschy</i> Boiss.                  | Th  | Med./ Ir-Tu.          |
| Poaceae        | <i>Avena barbata</i> Pott. ex Link.             | Th  | Med./ Ir-Tu.          |
| Poaceae        | <i>Avena fatua</i> L                            | Th  | Eur-Si.               |
| Poaceae        | <i>Avena sterilis</i> L.                        | Th  | Med./ Ir-Tu.          |
| Poaceae        | <i>Bromus diandrus</i> Roth.                    | Th  | Med.                  |
| Poaceae        | <i>Bromus rigidus</i> Roth.                     | Th  | Med./ Eur-Si.         |
| Poaceae        | <i>Cutandia memphitica</i> (Sprengel.)Rich      | Th  | Ir-Tu./ Sah-Ar.       |
| Poaceae        | <i>Cynodon dactylon</i> (L.) Pers.              | Geo | Trop.                 |
| Poaceae        | <i>Dactylis glomerata</i> L.                    | Th  | Med./ Ir-Tu.          |
| Poaceae        | <i>Dactyloctenium aegyptium</i> (L.)Asch.&Cshw. | Th  | Trop.                 |
| Poaceae        | <i>Hordeum murinum</i> L.                       | Th  | Plu.                  |

|                  |                                              |     |                       |
|------------------|----------------------------------------------|-----|-----------------------|
| Poaceae          | <i>Hyparrhenia hirta</i> (L.) Stapf          | H   | Plu.                  |
| Poaceae          | <i>Lagurus ovatus</i> L.                     | Th  | Plu.                  |
| Poaceae          | <i>Lamarckia aurea</i> (L.) Moench           | Th  | Med./ Ir-Tu./ Sud.    |
| Poaceae          | <i>Lolium rigidum</i> Gaud.                  | Th  | Plu.                  |
| Poaceae          | <i>Lophochloa salzmannii</i> Boiss &H.scholz | Th  | Med.                  |
| Poaceae          | <i>Lygeum spartum</i> Loefl. ex L.           | Geo | Med.                  |
| Poaceae          | <i>Pennisetum setaceum</i> (Forsk.)Chiov     | H   | Sud.                  |
| Poaceae          | <i>Phalaris minor</i> Retz                   | Th  | Med./ Ir-Tu.          |
| Poaceae          | <i>Poa bulbosa</i> L                         | Th. | Med.                  |
| Poaceae          | <i>Polypogon monspeliensis</i> (L) Desf.     | Th  | Plu.                  |
| Poaceae          | <i>Psilurus incurvus</i> Gouan.              | Th  | Med./ Ir-Tu.          |
| Poaceae          | <i>Setaria adhaerens</i> (Forsk.)Chiov       | Th  | Plu.                  |
| Poaceae          | <i>Stipa barbata</i> Desf.                   | Geo | Med./ Ir-Tu.          |
| Poaceae          | <i>Stipa capensis</i> Thunb.                 | Th  | Med./ Ir-Tu./ Sah-Ar. |
| Poaceae          | <i>Stipa parviflora</i> Desf.                | Geo | Med./ Ir-Tu.          |
| Poaceae          | <i>Stipa tenacissima</i> L.                  | Geo | Med.                  |
| Poaceae          | <i>Stipagrostis ciliata</i> ( Desf.)deWinte  | H   | Sah-Ar.               |
| Poaceae          | <i>Trachynia distachya</i> (L.) Link.        | Th  | Med./ Ir-Tu.          |
| Polygonaceae     | <i>Emex spinosus</i> L                       | Th  | Med./ Ir-Tu.          |
| Polygonaceae     | <i>Polygonum equisetiforme</i> Sibth.        | Ch  | Plu.                  |
| Polygonaceae     | <i>Rumex bucephalophorus</i> L.              | Th  | Med.                  |
| Polygonaceae     | <i>Rumex pulcher</i> L.                      | H   | Temp.                 |
| Polygonaceae     | <i>Rumex tingitanus</i> L.                   | Th  | Ir-Tu.                |
| Polygonaceae     | <i>Rumex vesicarius</i> L.                   | Th  | Sah-Ar.               |
| Primulaceae      | <i>Anagallis arvensis</i> L.                 | Th  | Med./ Ir-Tu./ Eur-Si. |
| Primulaceae      | <i>Anagallis monelli</i> L.                  | Th  | Med.                  |
| Ranunculaceae    | <i>Adonins dentata</i> Delile.               | Th  | Med./ Ir-Tu.          |
| Ranunculaceae    | <i>Delphinium halteratum</i> Sibth. & Smith. | Th  | Med.                  |
| Ranunculaceae    | <i>Nigella arvensis</i> L.                   | Th  | Med./ Ir-Tu.          |
| Ranunculaceae    | <i>Ranunculus asiaticus</i> L.               | Th  | Med.                  |
| Ranunculaceae    | <i>Ranunculus bullatus</i> L.                | Th  | Med.                  |
| Resedaceae       | <i>Reseda alba</i> L.                        | Th  | Med./ Ir-Tu./ Eur-Si. |
| Resedaceae       | <i>Reseda arabica</i> Boiss                  | th  | Med./ Sah-Ar.         |
| Resedaceae       | <i>Reseda lutea</i> L ssp.lutea              | Th  | Med./ Ir-Tu.          |
| Rubiaceae        | <i>Galium aparine</i> L.                     | Th  | Med.                  |
| Rubiaceae        | <i>Galium setaceum</i> Lam.                  | Th  | Med.                  |
| Rubiaceae        | <i>Galium tricorutum</i> Dandy.              | Th  | Med.                  |
| Rubiaceae        | <i>Galium verrucosum</i> Huds.               | Th  | Med.                  |
| Rubiaceae        | <i>Sheradia arvensis</i> L.                  | Th  | Med./ Ir-Tu.          |
| Rubiaceae        | <i>Valantia hispida</i> L.                   | Th  | Med.                  |
| Rubiaceae        | <i>Valantia lanata</i> Delile .              | Th  | Med.                  |
| Rutaceae         | <i>Ruta chalepensis</i> L.                   | Th  | Ir-Tu./ Sah-Ar.       |
| Santalaceae      | <i>Thesium humile</i> Vahl                   | Th  | Med.                  |
| Scrophulariaceae | <i>Kickxia egyptiaca</i> L                   | H   | Med./ Sah-Ar.         |

|                  |                                               |    |                       |
|------------------|-----------------------------------------------|----|-----------------------|
| Scrophulariaceae | <i>Linaria simplex</i> Desf.                  | Th | Med./ Ir-Tu./ Eur-Si. |
| Scrophulariaceae | <i>Linaria tarhunensis</i> Pamp .             | Th | Med.                  |
| Scrophulariaceae | <i>Linaria tenuis</i> (Viv.) Spreng.          | Th | Med./ Sah-Ar.         |
| Scrophulariaceae | <i>Linaria virgata</i> (Poir.)Desf            | Th | Med.                  |
| Scrophulariaceae | <i>Scrophularia arguta</i> Ait.               | Th | Med./ Sah-Ar.         |
| Scrophulariaceae | <i>Scrophularia canina</i> L                  | H  | Med.                  |
| Scrophulariaceae | <i>Scrophularia peregrina</i> L               | Th | Med./ Eur-Si.         |
| Scrophulariaceae | <i>Verbascum ballii</i> (Batt.)Qaiser         | H  | Med.                  |
| Scrophulariaceae | <i>Veronica anagallis –aguatica</i> L         | H  | Med./ Ir-Tu.          |
| Solanaceae       | <i>Lycium europaeum</i> L.                    | NP | Med.                  |
| Urticaceae       | <i>Urtica pilulifera</i> L.                   | Th | Med./ Ir-Tu./ Eur-Si. |
| Urticaceae       | <i>Urtica urens</i> L.                        | Th | Med./ Ir-Tu.          |
| Valerianaceae    | <i>Centranthus calcitrapae</i> (L.) Dufrense. | Th | Med.                  |
| Valerianaceae    | <i>Valerianella discoidea</i> (L.) Loisel.    | Th | Med./ Ir-Tu.          |
| Valerianaceae    | <i>Valerianella petrovichii</i> Asherson .    | Th | Med.                  |
| Zygophyllaceae   | <i>Fagonia cretica</i> L.                     | H  | Med.                  |
| Zygophyllaceae   | <i>Peganum harmala</i> L.                     | Th | Med./ Ir-Tu.          |