

Analysis of the Floristic Composition, Biological Spectrum and Chorotype of Asteraceae, Fabaceae and Poacea in the AL-Akhdar Mountainous Regions, North- Eastern Libya

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تحليل التركيب الفلوري، الطيف البيولوجي والتوزيع الجغرافي للعائلات المركبة، البقولية والنجيلية في مناطق الجبل الاخضر، شمال شرقي ليبيا

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Abstract:

The study was conducted at 24 sites in the Green Mountain area during the spring and summer seasons of 2024-2025, according to the elevations above sea level and the topography. A total of 267 species within 131 genera were recorded, including 82 species (31%) of monocots and 185 species (69%) of dicots. Annual plants accounted for 189 species, and perennial plants for 78 species. The genera with the highest numbers were represented in the Asteraceae by the genus *Crepis* (6.06%), in the Fabaceae family by the genus *Trifolium* (15.11%), and in the Poaceae by the genus *Bromus* (8.53%). The results showed life-form that Therophytes (68.47%) were the most prevalent among the studied plant families, followed by partially Hemicrypophytes (18.35%) and Geophytes (5.24%). Annual plants of the Fabaceae, Poaceae, and Asteraceae families accounted for 77%, 73%, and 64%, respectively. They have adapted to climatic conditions and all habitats, which is attributed to their strategies for coping with drought periods. The study also indicated that the analysis of chorotype showed that the mono-region pattern was the most widespread, with 152 species (65%), represented by the Mediterranean pattern with 127 species and the Arab desert pattern with 8 species. The Bio-region pattern included 78 species (29%), represented by the Mediterranean–Iran–Turanian. The Mediterranean pattern is more widespread among the species, as climate plays a major role in the distribution of plants. The three families of species are of great importance in the diversity of vegetation in the Jebel Akhdar region, and their environment must be preserved to protect them and ensure the sustainability of the ecosystem.

Keywords: Floristic composition, Life-form, Chorotype, Asteraceae, Green mountain.

الملخص:

اجريت الدراسة على 24 موقع بمنطقة الجبل الاخضر، خلال فصلي الربيع والصيف 2024-2025م، تبعا للارتفاعات عن مستوى سطح البحر والتضاريس، تم تسجيل 267 نوعا ضمن 131 جنسا تمثل ذوات الفلقة الواحدة 82 نوع (31%) وذوات الفلقتين 185 نوع (69%) ونباتات الحولية بعدد 189 نوع ونباتات المستديمة بعدد 78 نوع واكثر الاجناس عددا ممثلا للعائلة المركبة جنس *crepis* (6.06%) ثم العائلة البقولية جنس *Trifolium* (15.11%) والعائلة النجيلية جنس

Bromus (8.53%). أظهر النتائج ان انماط اشكال الحياة للنباتات الحولية (68.47%) أكثر تواجدا للعوائل النباتية المدروسة و نصف المخفية (18.35%) و نباتات الارضية (5.24%)، ان النباتات الحولية للعائلة البقولية والنجيلية و المركبة بنسب 77%، 73% و 64% على التوالي. وإنها تكيفت مع ظروف المناخية وجميع المواطن ويرجع ذلك الى استراتيجياتها في مواجهة فترات الجفاف. وبينت الدراسة ان تحليل التوزيع الجغرافي للنباتات ان نمط احادى المنطقة أكثر انتشارا بعدد 152 نوع (65%) ممثلا بنمط البحر المتوسط 127 نوع و نمط الصحارى العربية 8 أنواع، النمط ثنائى المنطقة بعدد 78 نوع (29%) ممثل في نمط البحر المتوسط – ايران تورانى، وان نمط البحر المتوسط أكثر انتشارا بين الانواع حيث يلعب المناخ دورا كبيرا في توزيع النباتات. وان انواع العوائل الثلاثة لها اهمية كبرى في تنوع الغطاء النباتى بمنطقة الجبل الاخضر والتي يجب المحافظة على بيئتها من اجل صونها واستدامة نظام البيئي.

الكلمات المفتاحية: التركيب النباتي، شكل الحياة، النمط الجغرافي، الفصيلة النجمية، الجبل الأخضر.

Introduction:

Libya is located in North Africa, and south of the Mediterranean Sea, with a coastline stretching 2000 km and an area of about 1,759,540 square kilometers [1]. And about 94-98% of its land is desert. It is considered one of the driest countries, with a predominantly arid climate. The Al-Jabal Al-Akhdar (Green Mountain), located in northeastern Libya, is a critical phytogeographical region characterized by its rich biodiversity and varied habitat types [2].

Life-forms represent one of the fundamental functional classifications in plant ecology, reflecting the adaptive strategies of plants to environmental conditions. The concept was first formalized by Raunkiaer, who classified plants based on position of their perennating buds during unfavorable seasons such as drought or cold periods [3]. The distribution of life-forms within a region reflects its climatic characteristics and disturbance regime. Therophytes often dominate in arid and semi-arid environments due to their life cycle and drought escape strategy, phanerophytes are more abundant in humid and stable environments, the proportion of each life-form category within a flora is known as the biological spectrum, which serves as an ecological indicator of climate and environmental pressures. Therefore, analyzing life-form composition provides important information about vegetation dynamic, ecological adaptation, and environmental stress factors. In Mediterranean ecosystems, such those found in the Al-Jabal Al-Akhdar region of Libya for understanding plant responses to seasonal drought and anthropogenic disturbances [4].

The analysis of chorotypes provides essential insights into the origin, migration routes, and ecological adaptation of plant taxa. By grouping species into chorological categories such as Mediterranean, Saharo-Arabian, Irano-Turanian, Euro-Siberian, Cosmopolitans, Paletropical and other, researchers can better understand the floristic composition and biogeographical relationships of a given region [5]. In Mediterranean-type, chorotype analysis is particularly valuable because regions often represent transitional zones between different phytogeographical territories therefore, studying chorotypes helps reveal whether a flora is predominantly Mediterranean, desert-affiliated, widely distributed or characterized by endemic elements. Moreover, chorological spectra (percentage representation of each chorotype) are frequently used as indicators of ecological conditions, climatic influences, and historical plant migration patterns [6]. The four Biogeographical regions are recognized, which are Sudanian region, Saharo-Arabian region, the Mediterranean region and Mauritanian steppe of Irano-Turanian region in Libya [7].

Life span represents a fundamental ecological and biological trait reflects the duration of a plant's life cycle from germination to death. It is considered one of the key functional characteristics used in vegetation ecology, floristic studies, and plant strategy analysis. Based on life span, plants are generally classified into three main categories: annuals, biennials and perennials. Understanding life span patterns within a flora contributes to interpreting vegetation dynamics. Plant community structure and adaptive strategies. Therefore, the analysis of life span categories provides valuable insights into ecosystem functioning and plant responses to environmental stress in Mediterranean-type ecosystem, annual species are often dominant due to seasonal rainfall patterns and summer drought. In contrast, perennial species are more common in stable habitats where long-term resource acquisition is advantageous [8].

The vegetation in Libya is sparse compared to its large area, with the Al-Jabal Al-Akhdar considered the most diverse region for the presence, spread, and distribution of flowering plants According to [9], Mountain, which has a Mediterranean climate, with hot dry summers and warm rainy winters. There is a change in the type of vegetation in relation to altitude, slope, soil, latitude, as well as the pattern of rainfall and the impact of human activities and natural disturbances such as forest fires, soil erosion, volcanic activity, and landslides. This change determines the dynamics of forests and the diversity of trees and herbs [10]. Several researchers conducted a study on the flora in Libya, including studies by [2] who listed 1600 plant species of flowering plants, whereas; [7] reported 1750 vascular plant species.

[11] revealed the presence of 2028 plant species representing 779 genera, and 149 families of Angiosperms. In [12], the study reported 2059 vascular plant species belonging to 787 genera, and 155 families. While, [13] reported 2103 vascular plant species that belong to 856 genera and 155 families. Of which seed plants were characterized by highest number of herbs (annual to perennial), and low number of woody (tree and shrub) species; these have an important influence on the structure of floral composition, the geographic element of the flora was predominantly tropical and Mediterranean. Mediterranean [14]. A complete flora of country is necessary to reflect the whole plant diversity of that country. On of plants in Libya is still comparatively unknown as far as in-depth ecological and botanical studies [15].

It is important to understand the floral composition and environmental dynamics, which is essential for preserving biodiversity, especially in areas facing environmental pressures such as climate change, habitat loss, and land use changes [16] and [17]. Flora refers to the brief taxonomic treatment of all plants occurring in a geographical location which generates a comprehensive account. A complete flora of country is necessary to reflect the whole plant diversity of that country [18].

The family Asteraceae (Compositae family) is considered the largest of the flowering plant families among cotyledons in terms of number of species [19], including more than 1,600 genera and over 25,000 species [20]. Most members of Asteraceae are herbaceous, subshrubs or shrubs, vines, or rarely trees [21], [22] and [23]. Shrubs and trees were represented by around 2% [8]. One of every 10 flowering plant species is in the family Compositae [24]. The species of this family grow in all habitats, and some of its types are considered economic plants, such as cooking oils, lettuce, sunflower seeds, artichokes, sweetening agents, coffee substitutes and herbal teas, and they have medicinal benefits [25]. The present paper provides an overview of the family Asteraceae depending on the analysis of flora of Libya, with chorotype, life form patterns and distribution of species. According to [26] and [27], there are 2088 species belonging to 844 genera and 145 families in flora of Libya as angiosperms. The dominant family in flora of Libya is Asteraceae with 240 species of 97 genera [28].

The Fabaceae (legume family) is the most diverse plant family in the world, belongs 770 genera and 19,500 species [29]. It is widely distributed and grows in all-natural habitats [30] [31]. The family has economic importance in supplying food crops that provide highly nutritious sources of protein and micronutrients for man and his animals [32], [33] and [34]. Fabaceae plant habits are trees, shrubs, and herbaceous plant perennials or annuals [35]. The grasses (Poaceae) are certainly the most important plant family for food production [36] to mankind agriculturally, economically and ecologically. The Family Poaceae contains approximately 11 000 species [37] distributed among about 750–770 genera [38] and [39]. It covers about 40% of the Earth's surface [40]. Poaceae members are annual or perennial herbs with fibrous roots and often rhizomes, Grasses have adapted to conditions in rain forests, dry deserts, and cold mountain steppes, and are now the most widespread plant type [41], which make up 20% of the world's vegetation coverage and are composed of Poaceae members [42] [43], [44] and [45].

This study aims to analyze the floral composition of the most numerous plant families, Asteraceae, Fabaceae, and Poaceae, in the Al-Jabal Al-Akhdar regions by understanding their life forms and geographical distribution, due to their economic and medicinal importance, their use for livestock, and their significant role within the ecosystem, which is affected by negative impacts such as drought and various human activities, which in turn influence the sustainable development of the vegetation.

Material and methods:

Study area: This work was carried out in Al-Jabal Al-Akhdar, located on the North-Eastern of Libya. Twenty- four sites were selected in the Green Mountain, these sites in Al Jabal Al-Akhdar representing various topographic with a gradient in elevation from sea level using a GPS, with a code for each site as follows: R1 to R24 shown in (Table:1 and Fig. 1).

Data Collection; In this botanical survey ten field trips were conducted seasonally to the study area from 2024 to 2025, From each study site, plant samples from the families Asteraceae, Fabaceae, and Poaceae were collected, identified, and classified based on the Flora of Libya by [2], [9], [46] [47], [48] and [49].

The Floristic Analysis: Life forms of species were determined depending upon the location of the regenerative buds and the shed parts during the unfavorable season [50]. The floristic categories of the investigated species were made to assign the registered species to world geographical groups according to [51] and [52].

Soil: The soil in the study area varies according to its geographic location, with clay being predominant in the southern sites, while reddish clay soil increases as we head north. The soil is mixed with limestone rocks, which represent the soil of the Green Mountain, and the soil depths vary from place to place, ranging from 15 to 30 cm.

Climate: The amounts of rainfall on the Green Mountain areas vary from year to year, especially during the rainy months, particularly in winter. These amounts also differ from one area to another depending on the nature of their terrain and their orientation toward the sea, with the northern slopes receiving larger amounts than the southern side of the Green Mountain. In general, the annual rainfall ranges between 150-450 mm, and the Green Mountain area follows a Mediterranean climate, with hot, dry summers and mild, rainy winters [53].

Table (1): Location and elevation of study sites.

Sites	Symbol	Longitude	Latitude	Elevation a.s.l (m)
Brace	R1	32° 32' 57.2" N	20° 41' 13" E	6
El-Bakar	R2	32° 31' 16.3" N	20° 44' 50.5" E	126
Wadi EL-Akar	R3	32° 30' 4.1" N	20° 43' 40.4" E	302
Talmeta	R4	32° 45' 51.2" N	21° 05' 48.4" E	48
El-merj	R5	32° 31' 19.9" N	20° 53' 29.5" E	278
Gasr Libya	R6	32° 38' 46.4" N	21° 28' 48.0" E	376
El-Wardia	R7	32° 39' 16.6" N	21° 33' 54.7" E	445
Wadi EL-Kouf	R8	32° 41' 15.0" N	21° 33' 48.6" E	310
Massa	R9	32° 43' 32.5" N	21° 35' 26.7" E	506
Al Mansora	R10	32° 50' 44.8" N	21° 50' 30.3" E	286
Shahat	R11	32° 50' 29.1" N	21° 53' 50.4" E	355
Susa	R12	32° 53' 11.6" N	21° 56' 54.8" E	36
Ras El-Hilal	R13	32° 52' 16.6" N	22° 10' 40.7" E	285
Wadi Karssa	R14	32° 51' 24.9" N	22° 24' 14.4" E	350
Derna	R15	32° 55' 1.4" N	22° 08' 20.3" E	96
Susa-Derna	R16	32° 51' 24.9" N	22° 24' 14.4" E	12
Labrag	R17	32° 47' 29.4" N	22° 05' 51.8" E	673
Wadi Moussa	R18	32° 45' 17.2" N	21° 51' 46.7" E	628
Wadi El-Ghareeb	R19	32° 44' 36.5" N	21° 45' 53.5" E	551
Sidi el-Hemery	R20	32° 38' 21.0" N	21° 47' 21.7" E	839
Slonta	R21	32° 30' 55.8" N	21° 27' 20.1" E	529
Qandula	R22	32° 31' 23.5" N	21° 35' 42.5" E	626
Marrow	R23	32° 28' 58.0" N	21° 22' 28.7" E	473
Taknis	R24	32° 26' 59.5" N	21° 06' 19.5" E	448

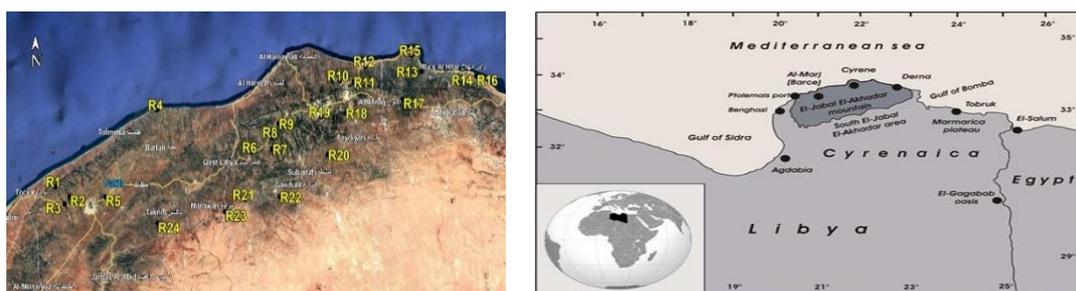


Figure (1): Map of the study sites.

Results and discussion:

In the present investigation, 267 species were reported belonging to 131 genera of three families, represented by Asteraceae, Fabaceae and Poaceae in Green Mountain (Appendix 1), species are recorded (Table 2) (figure 3) of which Dicots. includes 185 Species and Monocots 82 Species. Dicots are represented by two Families and 85 Genera while the Monocots are represented by one Family and 46 Genera. The contribution of Species included 69 % and 31% respectively for dicots and monocots. Taxa of study area to compared between Asteraceae, Fabaceae and Poaceae (Figure 4). as reported by other researchers from other areas i.e., [2], [54], [55], [56], [57], [58], [59], [60], [61], [62], [63], [64]and [65].

Table (2): of plant groups in all the study sites.

Taxa		Families	Genera	Species
Angiosperms	Monocot	1	46	82
	Dicot	2	85	185
Total		3	131	267

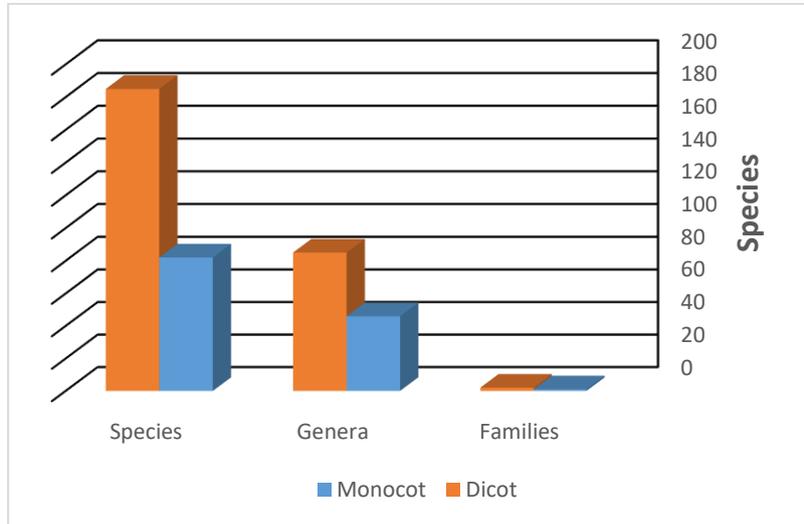


Figure (3): Shows Classification of plant groups on study sites.

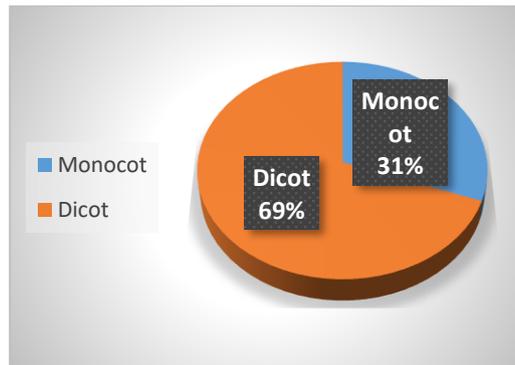


Figure (4): percentage Monocot and Dicot of plant groups on study sites.

The results obtained showed that the largest plant families in Flora of Libya, the study areas were as follows Asteraceae 37 % (99 sp.) followed by Fabaceae 32% (86 sp.) and Poaceae 31% (82 sp.), and to genera were as follows Asteraceae 45 % (59) followed by Poaceae 35% (46) and Fabaceae 20 % (26) (Table 3) (Figure 5). And, when comparing these of families in green mountain, (Figure 6) (Figure 7) here was a similarity in the results with [2], [60], [61], [62], [63], [64], and [66].

Table (3): Shows the numbers and percentage of genus and species in all the Families

Family	Genera		Species	
	No of Genera	%	No of species	%
Asteraceae	59	45,03	99	37,07
Fabaceae	26	19,86	86	32,20
Poaceae	46	35,11	82	30,73
Total	131	100	267	100

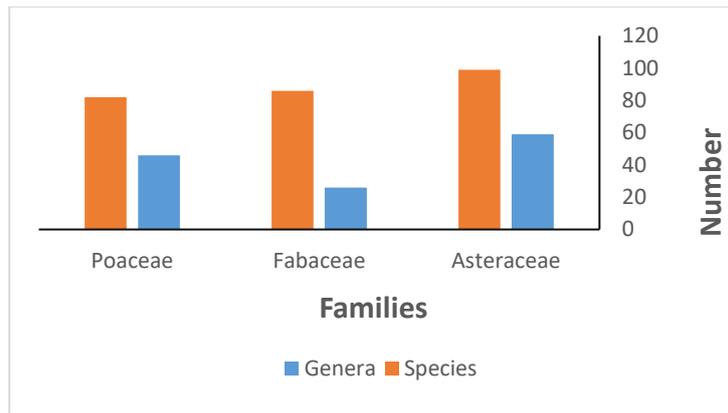


Figure (5): Comparison of Number of Genera and Species of study area.

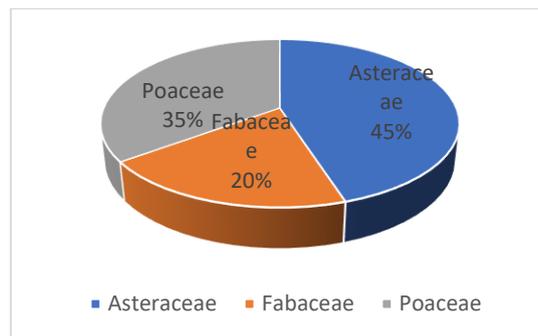


Figure (6): Comparison of The Percentage of Genera in study sites.

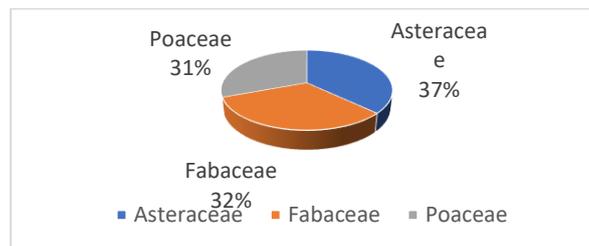


Figure (7): Comparison of The Percentage of species in study sites.

The results showed a scarcity of plant species compared to global flora, as the low rainfall significantly affected the growth, density, and distribution of vegetation cover, especially since the Green Mountain area is the richest region in Libya in terms of plant species compared to other areas (Table 4) (Figure 8). Although the flora in the Green Mountain constitutes 95% of Libya's plants, the proportions of species numbers are close to international flora ratios, with plant families such as Asteraceae, Fabaceae, and Poaceae having the highest numbers. This agrees with many previous studies in the Green Mountain regions [55], [56], [59], [61], and [65].

Table (4): Shows to compered the numbers of genus and species in the flora in the World, Libya and study sites all three families.

Family	In World		In Libya		In Study sites	
	Genera	Species	Genera	Species	Genera	Species
Asteraceae	1600	25000	97	240	59	99
Fabaceae	770	19500	42	198	26	86
Poaceae	700	11000	91	226	46	82

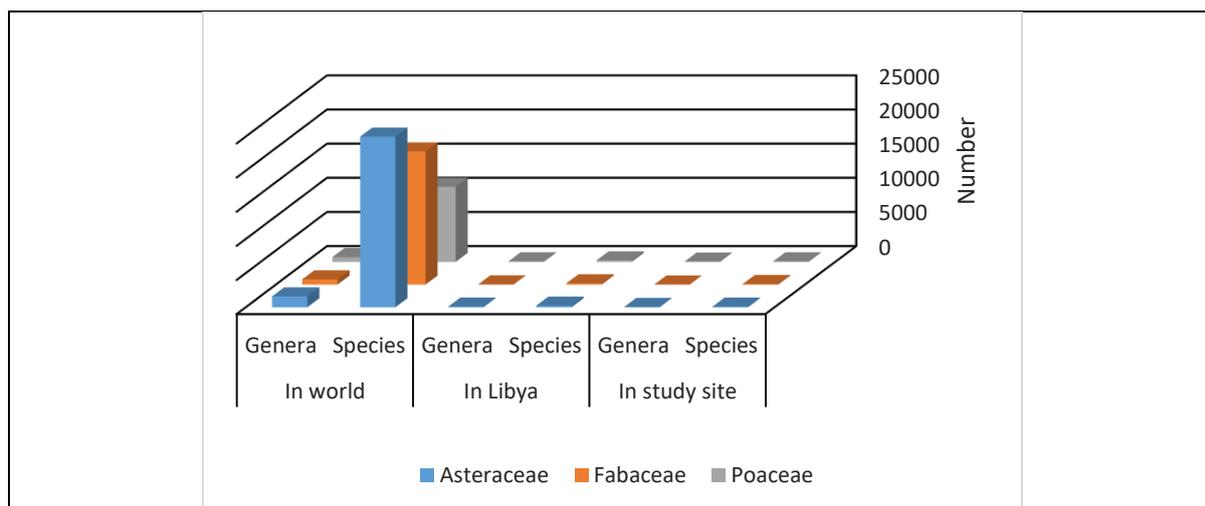


Figure (8): Comparison of numbers of genus and species in the flora in the World, Libya and study sites all three families.

The plant species that have been collected from the study area in the list of Genera, according to the classification of Angler as presented in Figure 3. While we comparing the largest families of green mountain regions with the largest families of the Libyan flora, it was noted that the compound family (Asteraceae) is in the most widespread is the region and in Libya, followed by the family Poaceae then Fabaceae. This is agreement with previous studies of [67], [68] [69], and [70]. (Table 5). In addition, the dominance of Asteraceae, Fabaceae and Poaceae families was an expected result, because most of its members' ware herbaceous plants. However, perennial plants often are distinguished from annual plants in that they complete their life cycle during a relatively short favorable growth period. Drought and high temperatures place severe restrictions on plant growth from late spring to early fall. Such conditions generally favor short-lived life forms such as annuals (33). The depth of the soil plays an important role in the spread and distribution of plant species and their density from one habitat to another in the Green Mountain, and the terrain constitutes a fundamental factor in plant abundance. Since most plants of the Asteraceae, Fabaceae, and Poaceae families are herbs, their roots extend to a depth of less than 30 cm.

Table (5): Analysis the numbers of species in all genus of all families.

Asteraceae			Fabaceae			Poaceae		
Genus	No specie	%	Genus	No specie	%	Genus	No specie	%
Crepis	6	6.06	Trifolium	13	15.11	Bromus	7	8.53
Centaurea	4	4.04	Medicago	11	12.79	Poa	6	7.31
Anthemis	4	4.04	Lotus	10	11.62	Hordeum	4	4.87
Carlina	3	3.03	Vicia	8	9.30	Aegilops	4	4.87
Carthamus	3	3.03	Ononis	6	6.97	Vulpia	4	4.87
Cichorium	3	3.03	Lathyrus	5	5.81	Lolium	3	3.65
Onopordum	3	3.03	Melilotus	4	4.65	Polypogon	3	3.65
Phagnalon	3	3.03	Astragalus	3	3.48	Setaria	3	3.65
Atractylis	2	2.02	Trignella	3	3.48	Phalaris	3	3.65
Cynara	2	2.02	Calicotome	2	2.32	Setaria	3	3.65
Evax	2	2.02	Anthyllis	2	2.32	Phalaris	3	3.65
Amberboa	2	2.02	Orther of 15 families	1	17.44	Polypogon	3	3.65
Bellis	2	2.02	Total	86	100	Piptatherum	3	3.65
Chamomilla	2	2.02				Lophochloa	2	2.43
Chrysanthemum	2	2.02				Aira	2	2.43
Cirsium	2	2.02				Avena	2	2.43
Crupina	2	2.02				Catapodium	2	2.43
Echinops	2	2.02				Orther of 29 families	1	35.3
Filago	2	2.02				Total	82	100
Hypochaeris	2	2.02						
Pallenis	2	2.02						
Picris	2	2.02						
Pulicaria	2	2.02						
Reichardia	2	2.02						
Scorzonera	2	2.02						
Urospermum	2	2.02						
Varthemia	2	2.02						
Orther of 32 families	1	32.3						
Total	99	100						

The results obtained when analyzing the plant families to determine the most diverse genera in the study areas of Al-Jabal Al-Akhdar indicated that the genera of the Asteraceae were as follows Crepis (6.06%), Centaurea and Anthemis (every genus 4.04%), then genera of Carlina, Carthamus, Cichorium and Onopordum (every genus 4.04%), In the Fabaceae family, we find that its most common species are Trifolium (15.11%), Medicago (12.79%), Lotus (11.62%), Vicia (8.30%) and Ononis (6.97%). And the family Poaceae diverse genera are the genera Bromus(8.53%), Poa(7.31%), Hordeum, Aegilops , Vulpia and Lolium (ever genus 4.87) (Figure 9) (Figure 10) (Figure 11). As pointed out by the study [1], [2] and [71].

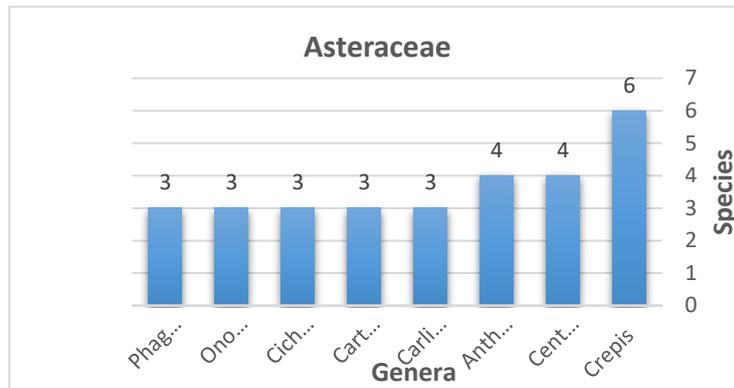


Figure (9): The richest of genera according to the number of species in the family Asteracea.

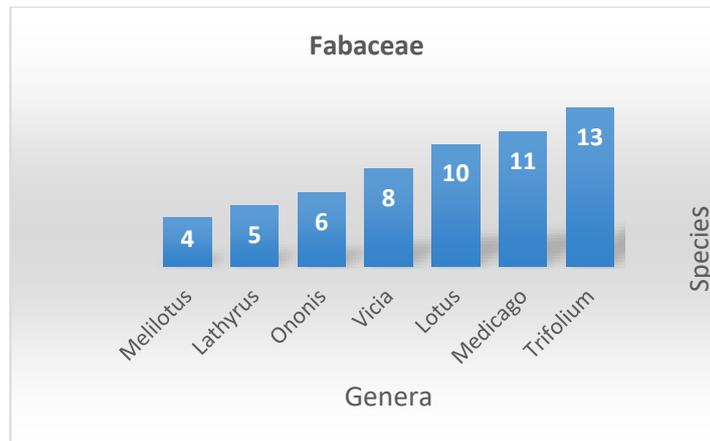


Figure (10) The richest of genera according to the number of species in the family Fabaceae.

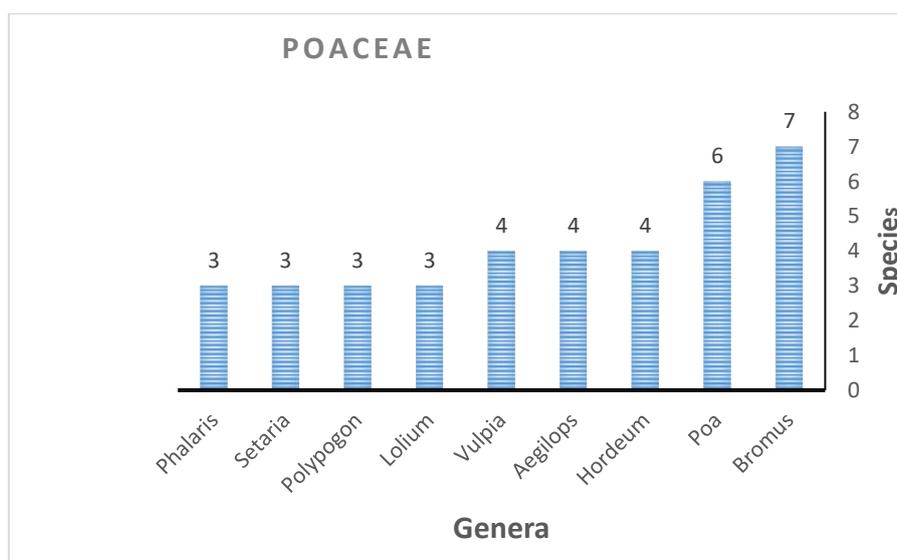


Figure (11): The richest of genera according to the number of species in the family Poaceae.

The results obtained indicated that herbs constitute the majority of plants in the Green Mountain in general, and annual (Ephemerals) herbs are more prevalent compared to perennial herbs with the proportions as follows: herbs (97%), Shrubs (2%) and trees (1%), (Figure 6). Based on the Life span in study 78 (29 %) species were Perennial and 189 (71 %) species of Annuals (Figure 12). To comparable Life span between the families Fabaceae 66 (34.92 %), Asteraceae 63 (33.33%) and Poaceae 63 (31.74%) species were Annual herbs then, herbs, shrubs and trees 78 species of perennial (Figure 13) Our findings are comparable with those of [26] and [49], and [71] also It was observed that the herbs are more diverse in the Mediterranean mountains ecological system. The perennial plant species were mostly herbaceous, and shrubs without any woody Asteraceae species. The dominance of annuals may. [10], [14], [28]and [72].

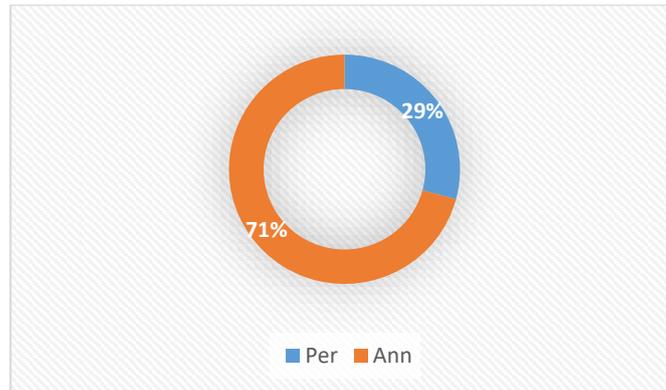


Figure (12): Comparison of Life span of species of Families in study sites.

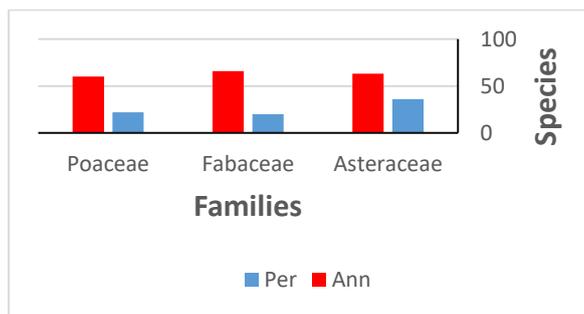


Figure (13): Comparison of Life span of species between all families.

The life form spectrum of Green Mountain to study three families showed that the most dominant life form is Therophytes with (68.47 %), followed by Hemicryptophytes (18.35 %), Geophytes (5.24%), Chamaephytes (4.86%), and phanerophytes (0.1%). (Table 6) (Figure 14) This generally represents the types of life forms in the study areas before making a comparison between the three families (Figure 15).

The results of the comparison between the three families in terms of life forms showed that the most dominant life form is Therophytes with (64%), followed by and Hemicryptophytes (28%), Chamaephytes (5%) then Geophytes (3 %) in the Asteraceae while in the Fabaceae showed that life form is Therophytes with (77 %), followed by and Hemicryptophytes (13%), Chamaephytes (8%) and phanerophytes (2 %) and also life form of Poaceae is Therophytes with (73%), followed by and Geophytes (14 %)Hemicryptophytes (12%) then Chamaephytes (1%). (Figure 16) (Figure 17) (Figure 18) confirmed by the studies of [76] and [77]. The difference in the proportions of Therophytes shows that the southern slope has a higher proportion and fewer trees due to the low rainfall and higher elevation compared to the northern slope. This results in the growth of herbs, especially seasonal ones, after the rainfall, which cannot withstand the dry period in summer. Additionally, a number of studies have shown that the diversity of life forms is correlated with variations in climate and decreases with elevation. This has been agreed upon by the studies of both [65], [66], [72], [73], [74] and [75].

Table (6): Shows the numbers and percentage of biological spectrum in all the Families

Life forms	Asteraceae		Fabaceae		Poaceae	
	No of species	%	No of species	%	No of species	%
phanerophytes	-	-	2	3.32	-	-
Chaemephytes	5	5.05	7	8.13	1	1.21
Hemicryptophytes	28	28.28	11	12.7	10	12.19
Geophytes	3	3.03	-	-	11	13.41
Therophytes	63	63.63	66	76.74	60	73.17
Total	99	100	86	100	82	100

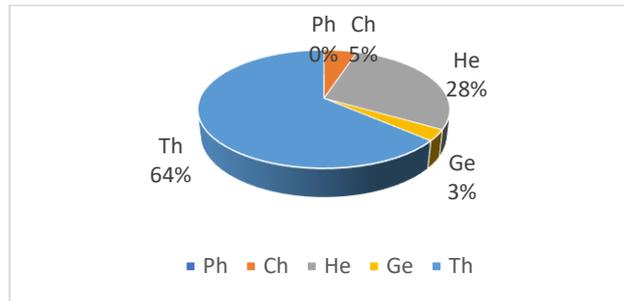


Figure (14): Comparison of life forms of Families in all study sites.

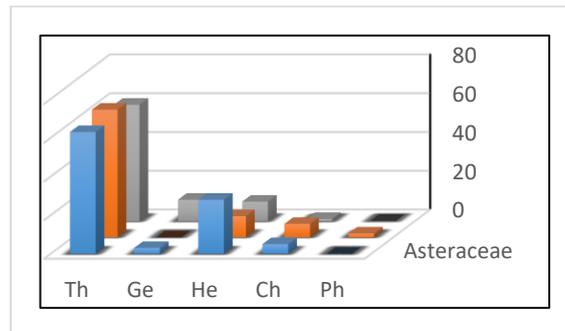


Figure (15): Comparison of life forms in Three families.

In general, Therophytes are predominant among the three plant pioneers and have great ability and adaptability to environmental conditions.



Figure (16): Shows of Life form spectrum in family Asteraceae.



Figure (17): Shows of Life form spectrum in family Fabaceae.

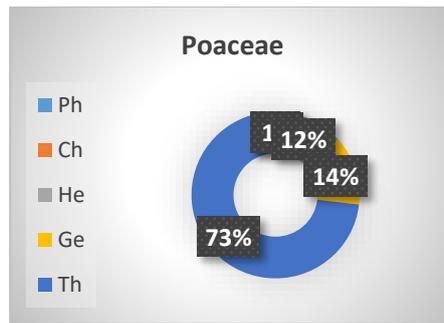


Figure (18): Shows of Life form spectrum in family Poaceae.

This percentage of species is considered a slightly lower than the previous studies of, (3), (6), (8), (12). The percentage for each of them was about 5% where of the total flora, and this is what came out (2). They accounted for about 4% of the Libyan flora, about 50% of these that the plants endemic to Libya plants were concentrated in the Green Mountain region. Distinctive as it contained this percentage of plants. Results of the total chorological analysis of the surveyed flora presented in, which revealed that 152 species (56.92%) of the total recorded species were mono-regional in being native to Mediterranean chorotype (137 species), Saharo-Arabian (8 species), Tropical (6 species) and Euro Siberian chorotype (2 species). About 29.2% of the recorded species were Bi-regional (78 species) in being native to Mediterranean + Irano-Turanian, Mediterranean + Euro-Siberian, Irano-Turanian and Saharo-Arabian. Mediterranean + Saharo-Arabian, Med + regions. Pluri regional (13.85 %) extending their distribution all over the Mediterranean+Euro-Siberian+Irano-Turaniana and Mediterranean+Saharo-Arabian+ Irano-Turanian regions (Table 7) (figure 19). Geographical distribution of the studied area showed the dominance of Mediterranean, which can be due to lack of rain. It seems that the annual life form is the preferable strategy in the study area.

As noted by many previous studies in arid and semi-arid regions, such as studies in Brazil cerrado sites [78], the NW Himalayas [79], in Mount Hymettus (Central Greece), [80] in South Africa [81], and Saudi Arabia [82].

Table 7: Shows the numbers and percentage of Chorotype in all the Families

Chorotype	Asteraceae		Fabaceae		Poaceae	
	No of species	%	No of species	%	No of species	%
Mono-regional						
Med	57	57.57	50	58.13	30	36.58
Eu-Si	1	1.01	1	1.16	-	-
Sa-Ar	6	6.06	1	1.16	1	1.21
Ir-Tu	-	-	1	1.16	-	-
Trop	-	-	1	1.16	3	3.65
Bir-egional						
Med /Ir-Tu	15	15.15	13	15.11	23	28.04
Ir-Tu/ Eu-Si	-	-	-	-	1	1.21
Med / Eu-Si	8	8.08	5	5.81	-	-
Med / Sa-Ar	1	1.01	2	2.32	-	-
Med / Trop	1	1.01	-	-	1	1.21
Med / Steppe	1	1.01	-	-	-	-
Ir-Tu/ Sa-Ar	3	3.03	1	1.16	3	3.65
Plur-regional						
Med /Ir-Tu/ Eu-Si	5	5.05	10	11.62	9	
Med /Ir-Tu/ Sa-Ar	1	1.01	1	1.16	3	3.65
Med /Ir-Tu/ Trop	-	-	-	-	1	1.21
Plur	-	-	-	-	6	7.31
Cosm	-	-	-	-	1	1.21
Total	99	100	86	100	82	100

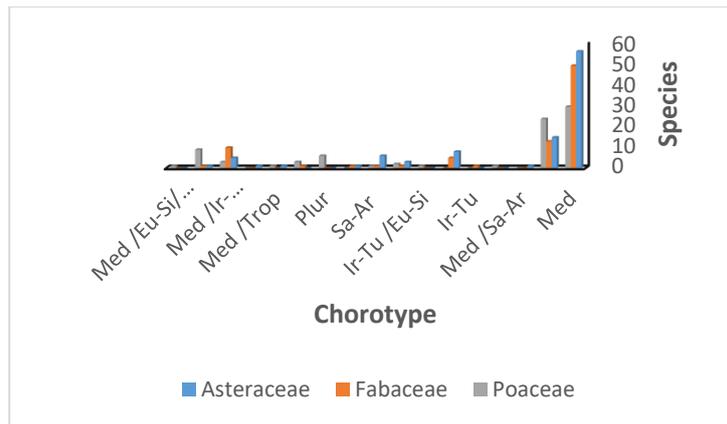


Figure (19): Comparison of Chorotype between Three families.

The results showed the geographical distribution of the compound family as follows Med, Med /Ir-Tu and Med /Eu-Si, 57.57%, 15.15% and 8.08%. And while, the Fabaceae family showed that Med /Eu-Si, 58.13 %, 15.11% and 5.81% and The Poaceae family is represented by the geographical distribution as follows Med, Med /Ir-Tu and Cosm, 36.58 %, 28.04% and 7.31%. In general, the Mediterranean and Mediterranean + Irano-Turanian types are the most widely distributed among the studied plant families, which reflects their rapid success and adaptation to environmental conditions. The family Asteraceae species are located within the boundaries of the Saharo-Arabian and Mediterranean regions. Therefore, it seems that the family Asteraceae is cosmopolitan in its distribution (Figure 20) (Figure 21) (Figure 22).

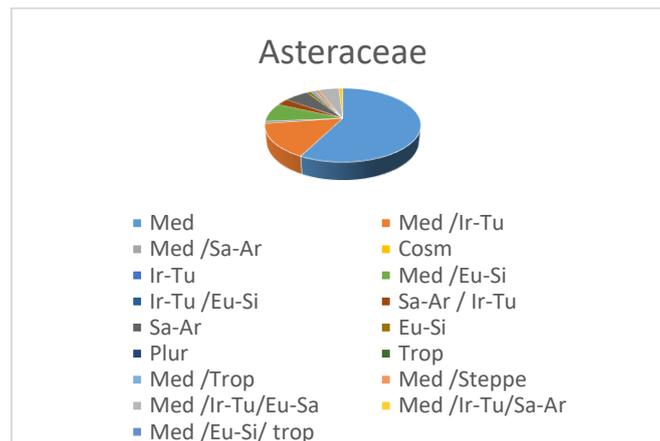


Figure (20): Shows of Chorotype of family Asteraceae.

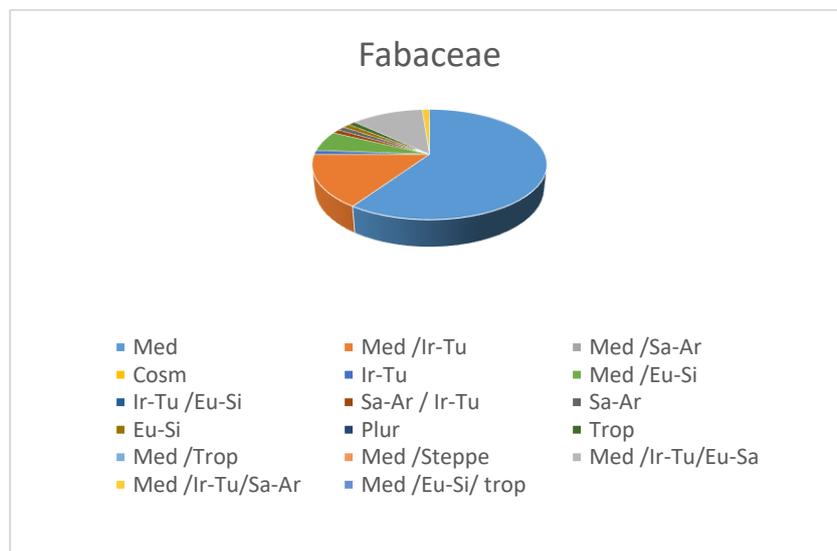


Figure (21): Shows of Chorotype of family Fabaceae.

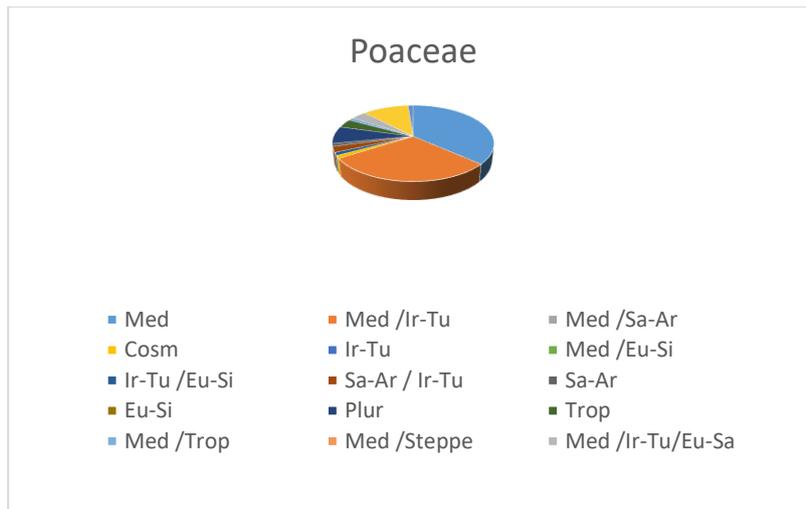


Figure (22): Shows of Chorotype of family Poaceae.

Through the study of the distribution patterns of the three types of families, it is found that the mono-regional geographic distribution is the most widespread among other distribution patterns, reflecting the Mediterranean and desert climates and their significant influence on the spread and distribution of plants in Al-Akhdar Mountain as shown in Figure 23 and Figure 24. These results are consistent with the studies of [72], [76], [77], [82], [83], [84], [85] and [86].

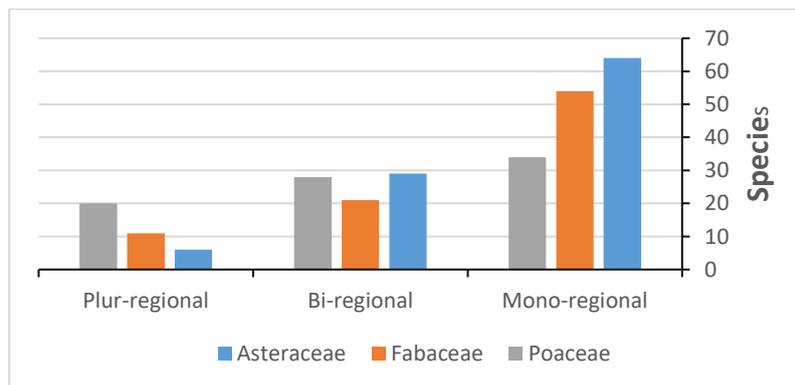


Figure (23): Comparison of floristic category of the flora in study sites all three families.

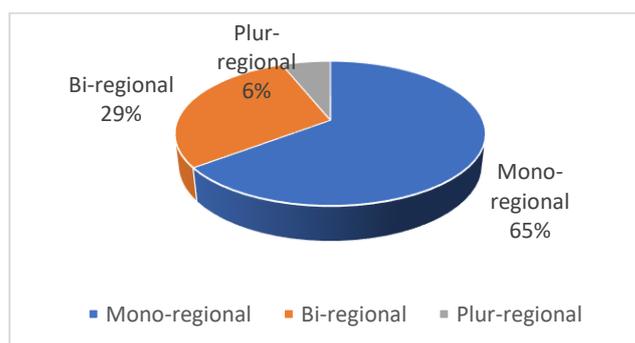


Figure (24): The frequency of the recorded plant species of families' relation to their floristic category.

The Climate is one of the most important factors affecting biodiversity, vegetation distribution, and soil composition, and the high temperature affects vegetation and the dominant species. It is evident from the above, when analyzing the flora of the Green Mountain areas, that there is a variation in species diversity from one place to another according to the influence of climate, the nature of the terrain, topography, and soil thickness. This vegetation is exposed to significant pressures, including fluctuations in rainfall and human activities such as overgrazing, urban expansion, road construction, and deforestation. In 2023, most areas of the Green Mountain were exposed to valley floods, this led to soil erosion in the areas of the valley floor and mountain slopes, carrying away the seed bank and affecting the density of plants in the following year. A significant portion of the vegetation disappeared

as a result of this event. Therefore, it is necessary to develop a strategy to protect and conserve the plant species of the studied families and others to preserve Libyan flora.

Conclusion

Through studying this floral composition and the life-forms of the third plant families, which constitute a large proportion of the plant diversity in the Green Mountain areas and have a high capacity to withstand environmental conditions, they must be conserved and protected from human activities and preserved within the mountainous ecosystem and for the medicinal, economic, and grazing resources they provide, and a strategy should be established for their sustainability.

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Appendix (1):

list of plants life span, life form and chorotype of study sites Floristic composition of the recorded species in the study area: Per. = Perennials, Ann. = Annuals; Th. = Therophytes, H.=Hemicryptophytes, G.= Geophytes, Ch. = Chamaephytes; COSM = Cosmopolitan, Med= Mediterranean, SA = Saharo-Arbian, ES = Euro-Siberian, IT. = Irano-Turanian, Trop=tropical.

Species	Family	Life Span	Life form	chorotype
<i>Anvillea garcinii</i> (Burm.f.) DC.	Asteraceae	Per	Ch	Sa-Ar / Ir-Tu
<i>Atractylis cancellata</i> L.	Asteraceae	Ann	Th	Med
<i>Centaurea alexandrina</i> Delile.	Asteraceae	Ann	Th	Med
<i>Cynara cornigera</i> Lindley.	Asteraceae	Ann	Th	Med
<i>Evax contracta</i> Boiss.	Asteraceae	Ann	Th	Med /Ir-Tu
<i>Achillea santolina</i> L. Zefra	Asteraceae	Per	He	Med
<i>Aetheorhiza bulbosa</i> (L.) Cass.	Asteraceae	Per	He	Med
<i>Amberboa crupnoides</i> (Deaf.) DC	Asteraceae	Ann	Th	Sa- Ar
<i>Amberboa tubiflora</i> Murb.	Asteraceae	Ann	Th	Med- Steppe
<i>Anacyclus clavatus</i> (Desf.) Pers -	Asteraceae	Ann	Th	Med
<i>Anthemis taubertii</i> Durand & Barratte.	Asteraceae	Ann	Th	Med
<i>Anthemis maritima</i> L.	Asteraceae	Per	Ch	Med
<i>Anthemis cotula</i> L.	Asteraceae	Ann	Th	Med /Ir-Tu/Eu-Si
<i>Anthemis cyrenaica</i> Coss. var. <i>cyrenaica</i>	Asteraceae	Ann	Th	Med
<i>Asteriscus aquaticus</i> (L.) Less	Asteraceae	Ann	Th	Med
<i>Atractylis canduus</i> (Fork.)Christensen.	Asteraceae	Per	He	Sa- Ar
<i>Bellis sylvestris</i> Cirillo	Asteraceae	Ann	Th	Med

<i>Bellis sylvestris</i> Cyn. var. <i>cyrenaica</i> Beg	Asteraceae	Ann	Th	Med
<i>Calendula arvensis</i> L.	Asteraceae	Ann	Th	Med /Ir-Tu /Sa-Ar
<i>Carduncellus caeruleus</i> (L.) C.Presl.	Asteraceae	Per	He	Med
<i>Cardus pycnocephalus</i> L.	Asteraceae	Ann	Th	Med /Ir-Tu
<i>Carlina sicula</i> Ten	Asteraceae	Ann	Th	Med
<i>Carlina involcrate</i> Poiret.	Asteraceae	Ann	Th	Med /Eu-Si
<i>Carlina lanata</i> L.	Asteraceae	Ann	Th	Med
<i>Carthamus divaricatus</i> Beguinot&Vacc	Asteraceae	Ann	Th	Med
<i>Carthamus glaucus</i> Bieb.	Asteraceae	Ann	Th	Med
<i>Carthamus lanatus</i> L.	Asteraceae	Ann	Th	Med
<i>Centaurea pumilio</i>	Asteraceae	Ann	Th	Med
<i>Centaurea melitensis</i>	Asteraceae	Ann	Th	Med / Eu-Si
<i>Centaurea cyrenaica</i> Beguinot & Vacc	Asteraceae	Ann	Th	Med
<i>Chamomilla aurae</i> (Loeft.) Gay ex Cosson &Kralik	Asteraceae	Ann	Th	Med / Ir-Tu
<i>Chamomilla pubescens</i> (Desf.) Alavi	Asteraceae	Ann	Th	Med
<i>Chrysanthemum segetum</i> L.	Asteraceae	Ann	Th	Med /Ir-Tu
<i>Chrysanthemum coronarium</i> L.	Asteraceae	Ann	Th	Med
<i>Cicerbita haimanniana</i> (Ascher.) Beau	Asteraceae	Per	Ge	Med
<i>Cichorium endivia</i> L. subsp. <i>Divaricatum</i> (Schousb.) P.D.	Asteraceae	Ann	Th	Med /Ir-Tu
<i>Cichorium pumilum</i> Jacq.	Asteraceae	Ann	Th	Med /Ir-Tu
<i>Cichorium spinosum</i> L.	Asteraceae	Per	He	Med
<i>Cirsium creticum</i> (Lam.) Durv.	Asteraceae	Ann	Th	Med
<i>Cirsium monpessulanum</i> (L.)Hill	Asteraceae	Per	He	Med
<i>Crepis libyca</i> (Pamp.) Shabet	Asteraceae	Per	He	Med
<i>Crepis nigricans</i> Viv.	Asteraceae	Ann	Th	Med
<i>Crepis pusilla</i> (Sommier) Merxm.	Asteraceae	Ann	Th	Med
<i>Crepis senecioides</i> Delille subsp. <i>filiformis</i> (Viv.) Alavi	Asteraceae	Ann	Th	Med
<i>Crepis spathulata</i> Guss.	Asteraceae	Per	He	Med
<i>Crepis vesicaria</i> ssp <i>tarxifolia</i> (Thull.)ex Schinz &Keller.	Asteraceae	Per	He	Med /Eu -Si
<i>Crupina crupinastrum</i> (Moris.) Vis	Asteraceae	Ann	Th	Med /Ir-Tu
<i>Crupina vulgaris</i> Cass	Asteraceae	Ann	Th	Med /Ir-Tu/ Er-Si
<i>Cynara cyrenaica</i> Maire & Weiller	Asteraceae	Ann	Th	Med
<i>Dittrichia viscosa</i> (L.) Greuter	Asteraceae	Per	He	Med
<i>Echinops cyrenaicus</i> Durand & Barratt.	Asteraceae	Ann	Th	Med
<i>Echinops galalensis</i> Schwein.	Asteraceae	Per	He	Med
<i>Evax pygmaea</i> L. Brot	Asteraceae	Ann	Th	Med
<i>Filago desertorum</i> Pomel	Asteraceae	Ann	Th	Ir-Tu / Sa-Ar
<i>Filago pyramidata</i> L.	Asteraceae	Ann	Th	Med/ Ir -Tu
<i>Francoeuria lanciniata</i> Cosson &Durien.	Asteraceae	Per	He	Sa-Ar
<i>Hedynois cretica</i> (L.) Dum.	Asteraceae	Ann	Th	Med
<i>Helichrysum stoechas</i> (L.) Moench A	Asteraceae	Per	He	Med
<i>Hypochaeris achyrophorus</i> L.	Asteraceae	Ann	Th	Med
<i>Hypochaeris glabra</i> L.	Asteraceae	Ann	Th	Med
<i>logfia gallica</i> L.	Asteraceae	Ann	Th	Med / Ir-Tu
<i>Launaea nudicaulis</i> (L) Hooker.	Asteraceae	Per	He	Med / Sa-Ar
<i>Leontodon tuberosus</i> L.	Asteraceae	Per	He	Med
<i>Mantiscalca duriaei</i> (Spach.) Briq. & Cavillier	Asteraceae	Ann	Th	Med

<i>Logfia minima</i> (Sm.) Dumort.	Asteraceae	Ann	Th	Med /Eu -Si
<i>Notobasis syriaca</i> (L.) Cass.	Asteraceae	Ann	Th	Med / Ir-Tu
<i>Onopordum arenarium</i> (Dest.) Pomel.	Asteraceae	Per	He	Med
<i>Onopordum cyrenaicum</i> Maire & Weiller	Asteraceae	Per	He	Med
<i>Onopordum espiniae</i> Coss & Bonnet	Asteraceae	Per	He	Med
<i>Otanthus maritimus</i> (L.) Hoffmanns& Link.	Asteraceae	Per	Ge	Med
<i>Pallenis cyrenaica</i> Alavi Asteraceae	Asteraceae	Per	He	Med
<i>Pallenis spinosa</i> (L.) Cass.	Asteraceae	Per	He	Med / Ir-Tu
<i>Phagnalon graenum</i> Boiss & Heldr.	Asteraceae	Per	Ch	Med
<i>Phagnalon rupester</i> (L.) DC.	Asteraceae	Per	Ch	Med / Ir-Tu
<i>Phagnalon saxatile</i> (L.) Cass.	Asteraceae	Per	Ch	Med
<i>Picris asplenioides</i> L.	Asteraceae	Ann	Th	Sa-Ar
<i>Picris mauginiana</i> Pamp.	Asteraceae	Ann	Th	Med
<i>Ptilostemon gnaphaloides</i> (Cirillo) Sojak	Asteraceae	Ann	Th	Med
<i>Pulicaria inuloides</i> (Poiret.) DC.	Asteraceae	Ann	Th	Sa-Ar
<i>Pulicaria vulgaris</i> Gaertn.	Asteraceae	Ann	Th	Eu-Si /Med
<i>Reichardia picroides</i> (L.) Roth.	Asteraceae	Per	He	Med
<i>Reichardia tingitana</i> (L.) Roth	Asteraceae	Per	He	Ir-Tu /Sa-Ar
<i>Rhagadiolus stellatus</i> (L.) Gaertner	Asteraceae	Ann	Th	Med / Ir-Tu
<i>Scorzonera hispanica</i> L.	Asteraceae	Per	He	Eu-Si
<i>Scorzonera lacinita</i> L.	Asteraceae	Per	Ge	Med /Ir-Tu/ Er-Si
<i>Senecio leucanthemifolius</i> Poir.	Asteraceae	Ann	Th	Med/Eu-Si
<i>Serratula cichoracea</i> (L.) DC.	Asteraceae	Ann	Th	Med
<i>Sonchus asper</i> (L.) Hill	Asteraceae	Per	He	Med / Ir-Tu
<i>Sonchus oleraceus</i> L.	Asteraceae	Ann	Th	Med /Ir-Tu/ Er-Si
<i>Sylibum marianum</i> (L.) Gaetner	Asteraceae	Ann	Th	Med /Ir-Tu/ Er-Si
<i>Tolpis virgata</i> (Desf.) Bertol.	Asteraceae	Per	He	Med
<i>Tragopogon hybridus</i> L.	Asteraceae	Ann	Th	Med / Eu-Si
<i>Tyrimnus leucographus</i> (L.) Cass.	Asteraceae	Ann	Th	Med
<i>Urospermum dalechampii</i> (L.) F.W.Schmidt	Asteraceae	Per	He	Med
<i>Urospermum picroides</i> (L.) F.W.Schmidt	Asteraceae	Ann	Th	Med / Ir-Tu
<i>Varthemia candidaus</i> (Delile .) Boiss.	Asteraceae	Per	He	Med
<i>Varthemia sericea</i> (Batt.&Traubut)Diels.	Asteraceae	Per	He	Sa-Ar
<i>Xanthium strumarium</i> L.	Asteraceae	Ann	Th	Trop / Med
<i>Xeranthemum inapertum</i> (L.) Miller.	Asteraceae	Ann	Th	Med / Eu-Si
<i>Trifolium scabrum</i> L.	Fabaceae	Ann	Th	Eu-Si /Med / Ir-Tu
<i>Trifolium subterraneum</i> L.	Fabaceae	Ann	Th	Med /Ir-Tu
<i>Vicia lutea</i> L.	Fabaceae	Ann	Th	Med
<i>Anagyris foetida</i> L.	Fabaceae	Ann	Th	Med /Ir-Tu
<i>Anthyllis tetraphylla</i>	Fabaceae	Ann	Th	Med
<i>Anthyllis vulneraria</i> ssp maura (Beck) Bornn	Fabaceae	Per	He	Med
<i>Astragalus boeticus</i> L.	Fabaceae	Ann	Th	Med
<i>Astragalus taubertianus</i> Aschres&Barbey.	Fabaceae	Ann	Th	Ir-Tu - Sa-Ar
<i>Astragalus tribuloides</i> Del.	Fabaceae	Ann	Th	Med /Ir-Tu
<i>Astraglus hispidulus</i> DC	Fabaceae	Ann	Th	Sa-Ar
<i>Biserrula pelecina</i> L.	Fabaceae	Ann	Th	/ Med
<i>Calicotome spinosa</i> (L.) Link	Fabaceae	Per	Ph	Med / Eu-Si

<i>Calicotome villosa</i> (Poir.) Link	Fabaceae	Per	ph	Med / Eu-Si
<i>Cicer arietinum</i> L.	Fabaceae	Ann	Th	Med / Eu-Si
<i>Dorycnium hirsutum</i> (L.) Ser.	Fabaceae	Per	He	Med
<i>Ebenus armitagei</i> Schweinf .et Traub.	Fabaceae	Per	Ch	Med
<i>Genista acanthoclada</i> DC.	Fabaceae	Per	Ch	Med
<i>Glycyrrhiza glabra</i> L.	Fabaceae	Per	He	Med/Sa-Ar/ Ir -Tu
<i>Hippocrepis cyclocarpa</i> Murb.	Fabaceae	Ann	Th	Med
<i>Hymenocarpus circinatus</i> (L.)Savi	Fabaceae	Ann	Th	Med/ Ir -Tu
<i>Lathyrus aphaca</i> L.	Fabaceae	Ann	Th	Med /Ir-Tu/Eu-Si
<i>Lathyrus gorgonei</i> Parl	Fabaceae	Ann	Th	Med
<i>Lathyrus hierosolymitanus</i> Boiss	Fabaceae	Ann	Th	Med
<i>Lathyrus clymenum</i> L.	Fabaceae	Ann	Th	Med
<i>Lathyrus setifolius</i>	Fabaceae	Ann	Th	Med
<i>Lotus conimbricensis</i> Brot.	Fabaceae	Ann	Th	Med
<i>Lotus gebella</i> Vent.	Fabaceae	Per	He	Ir-Tu
<i>Lotus halophilus</i> Boiss . exBorum	Fabaceae	Ann	Th	Med
<i>Lotus suaveolens</i> Pers.	Fabaceae	Ann	Th	Med/ Eu-Si
<i>Lotus collinus</i> (Boiss.) Heldr.	Fabaceae	Per	He	Med
<i>Lotus creticus</i> L.	Fabaceae	Per	He	Med
<i>Lotus cytisoides</i> L.	Fabaceae	Per	Ch	Med
<i>Lotus edulis</i> L.	Fabaceae	Ann	Th	Med
<i>Lotus ornithopodioides</i> L.	Fabaceae	Ann	Th	Med
<i>Lotus tetragonolobus</i> L.h	Fabaceae	Ann	Th	Med
<i>Lupinus micranthus</i> Guss	Fabaceae	Ann	Th	Med
<i>Medicago turbinata</i> (L.) All.	Fabaceae	Ann	Th	Med
<i>Medicago lupulina</i> L.	Fabaceae	Per	He	Med / Eu-Si / Ir-Tu
<i>Medicago disciformis</i> Dc	Fabaceae	Ann	Th	Med
<i>Medicago polymorpha</i> L.	Fabaceae	Ann	Th	Med / Eu-Si / Ir-Tu
<i>Medicago truncatula</i> Gaertn.	Fabaceae	Ann	Th	Med
<i>Medicago cyrenaica</i> Maire & Weill	Fabaceae	Ann	Th	Med / Ir-Tu
<i>Medicago rugosa</i> Desr.	Fabaceae	Ann	Th	Med
<i>Medicago sativa</i> L.	Fabaceae	Per	He	Med / Eu-Si / Ir-Tu
<i>Medicago littoralis</i> Rohde ex Lois.	Fabaceae	Ann	Th	Med
<i>Medicago minima</i> L.	Fabaceae	Ann	Th	Med / Eu-Si
<i>Medicago orbicularis</i> (L.) Bart.	Fabaceae	Ann	Th	Med / Ir-Tu
<i>Medicago truncatula</i> Gaertn.	Fabaceae	Ann	Th	Med
<i>Melilotus indicus</i> (L.) All.	Fabaceae	Ann	Th	Med
<i>Melilotus italicus</i> (L.) Lam.	Fabaceae	Ann	Th	Med
<i>Melilotus messanensis</i> (L.) All	Fabaceae	Ann	Th	Med
<i>Melilotus sulcatus</i> Desf.	Fabaceae	Ann	Th	Med
<i>Onobrychis crista-galli</i> (L.) Lam.	Fabaceae	Ann	Th	Sa-Ar/Med
<i>Ononis spinosa</i> L.	Fabaceae	Per	Ch	Med / Ir-Tu
<i>Ononis pendula</i> Desf.	Fabaceae	Ann	Th	Med
<i>Ononis hispida</i> Desf.	Fabaceae	Per	Ch	Med
<i>Ononis natrix</i> L.	Fabaceae	Per	Ch	Med
<i>Ononis reclinata</i> L.	Fabaceae	Ann	Th	Med / Ir-Tu
<i>Ononis viscosa</i> L.	Fabaceae	Ann	Th	Med

<i>Psoralea bituminosa</i> L.	Fabaceae	Per	He	Med
<i>Scorpiurus muricatus</i> L.	Fabaceae	Ann	Th	Med
<i>Spartium junceum</i> L.	Fabaceae	Per	Ch	Sa-Ar
<i>Tetragonolobus purpureum</i> Lois.	Fabaceae	Ann	Th	Med
<i>Trifolium suffocatum</i> L.	Fabaceae	Ann	Th	Med / Ir-Tu
<i>Trifolium campestre</i> Schreb,	Fabaceae	Ann	Th	Med
<i>Trifolium uniflorum</i> L.	Fabaceae	Per	He	Med
<i>Trifolium fragiferum</i> L.	Fabaceae	Per	He	Eu-Si/ Med / Ir-Tu
<i>Trifolium lappaaceum</i> L.	Fabaceae	Ann	Th	Med
<i>Trifolium micranthum</i> Viv	Fabaceae	Ann	Th	Trop
<i>Trifolium strictum</i> L.	Fabaceae	Ann	Th	Eu-Si
<i>Trifolium tomentosum</i> L.	Fabaceae	Ann	Th	Eu-Si/ Med / Ir-Tu
<i>Trifolium angustifolium</i> L.	Fabaceae	Ann	Th	Med / Eu-Si / Ir-Tu
<i>Trifolium arvense</i> L.	Fabaceae	Ann	Th	Med / Eu-Si /Ir
<i>Trifolium Pupureum</i> Lios.	Fabaceae	Ann	Th	Med
<i>Trifolium stellatum</i> L.	Fabaceae	Ann	Th	Med
<i>Trifolium subterranean</i> L.	Fabaceae	Ann	Th	Med
<i>Trignella coerulescens</i> (Bieb.) Halac.	Fabaceae	Ann	Th	Med /Ir-Tu
<i>Trignella maritima</i> Del.ex Poir.	Fabaceae	Ann	Th	Med
<i>Trignella gladiata</i> Stev.	Fabaceae	Ann	Th	Med
<i>Vicia laxiflora</i> Brot.	Fabaceae	Ann	Th	Med
<i>Vicia peregrina</i> L.	Fabaceae	Ann	Th	Med / Ir-Tu
<i>Vicia ervilia</i> (L.)Willd	Fabaceae	Ann	Th	Med / Ir-Tu
<i>Vicia hybrida</i> L.	Fabaceae	Ann	Th	Med
<i>Vicia sativa</i> L .	Fabaceae	Ann	Th	Med
<i>Vicia tetrasperma</i> (L.) Schreb.	Fabaceae	Ann	Th	Med / Eu-Si / Ir-Tu
<i>Vicia monantha</i> Retz.	Fabaceae	Ann	Th	Med /Ir-Tu
<i>Avena barbata</i> Pott ex Link.	Poaceae	Ann	Th	Med
<i>Avena sterilis</i> L.	Poaceae	Ann	Th	Ir-Tu /Med
<i>Briza maxima</i> L.	Poaceae	Ann	Th	Med
<i>Briza minor</i> L.	Poaceae	Ann	Th	Ir-Tu /Med/Eu-Si
<i>Cynosurus elegans</i> Desf.	Poaceae	Ann	Th	Ir-Tu /Med
<i>Lolium loliaceum</i> (Bory et Chaub.) Hand-Mazz	Poaceae	Ann	Th	Med
<i>Aegilops kokschyi</i> Boiss.	Poaceae	Ann	Th	Ir-Tu /Sa-Ar
<i>Aegilops ventricosa</i> Tausch.	Poaceae	Ann	Th	Med
<i>Aegilops neglecta</i> Req.ex Berto.	Poaceae	Ann	Th	Med
<i>Aegilops peregrina peregrina</i> (Hack.) Maire et Weill.	Poaceae	Ann	Th	Med
<i>Aira cupaniana</i> Guss.	Poaceae	Ann	Th	Med
<i>Aira tenorii</i> Guss.	Poaceae	Ann	Th	Med
<i>Alopecurus mysnroides</i> Huds.	Poaceae	Ann	Th	Ir-Tu /Med/Eu-Si
<i>Ammophila austalis</i> (Mbille.) Port et Rigo	Poaceae	Per	Ge	Med
<i>Andropogon distachyos</i> L.	Poaceae	Per	Ch	Med// Trop
<i>Antinoria insularis</i> (Parl.)Maire.	Poaceae	Ann	Th	Med
<i>Arando donax</i> L.	Poaceae	Per	Ge	Ir-Tu /Med
<i>Bromus intermedius</i> Guss.	Poaceae	Ann	Th	Ir-Tu /Med
<i>Bromus madritensis</i> L.	Poaceae	Ann	Th	Ir-Tu /Med
<i>Bromus rubens</i> L.	Poaceae	Ann	Th	Ir-Tu /Med/Sa-Ar

Bromus alopacuro Poir.	Poaceae	Ann	Th	Med
Bromus caroli-henrici Greuter..	Poaceae	Ann	Th	Med
Bromus chrysopogon Viv.	Poaceae	Ann	Th	Ir-Tu /Med
Bromus lanceolatus Roth.	Poaceae	Ann	Th	Ir-Tu /Med
Catapodium marinum (L.) C.E.Hubbard.	Poaceae	Ann	Th	Med
Catapodium rigidum (L.) C.E.Hubb.	Poaceae	Ann	Th	Med
Crithopsis delileana (Pourr.) Breistr.	Poaceae	Ann	Th	Ir-Tu /Med
Cynodon dactylon (L.) Pers.	Poaceae	Per	Ge	Plur
Cynosurus coloratus Lehm .ex Steud.	Poaceae	Ann	Th	Med
Dactylis glomerata L.	Poaceae	Per	Ge	Med
Desmazeria philistaea (Bioss.)H.Scholz.	Poaceae	Ann	Th	Med
Digitaria sanguialis (L.) Scop.	Poaceae	Ann	Th	Plur
Dinebra retroflexa (Vahl)Panz.	Poaceae	Ann	Th	Trop
Festuca arundinacea Schreb.	Poaceae	Per	Ge	Ir-Tu /Med/Eu-Si
Gastridium ventricosum (Gouan) Schinz et Thell.	Poaceae	Ann	Th	Med
Gaudinia fragilis (L.) P.Beauv.	Poaceae	Ann	Th	Med
Hordeum bulbosum L.	Poaceae	Per	Ge	Ir-Tu /Med
Hordeum geniculatum All	Poaceae	Ann	Th	Ir-Tu /Med
Hordeum murinum L. subsp. Murnium.	Poaceae	Ann	Th	Ir-Tu /Med
Hordeum vulgare L.	Poaceae	Ann	Th	Cosm
Hyparrhenia hirta (L.)Stapf.	Poaceae	Per	Ge	Ir-Tu /Med/Sa-Ar
Lagurus ovatus L.	Poaceae	Ann	Th	Ir-Tu /Med
Lamarckia aurea (L.) Moench	Poaceae	Ann	Th	Ir-Tu /Med
Lolium multiflorum Lam.	Poaceae	Per	He	Med
Lolium perenne L.	Poaceae	Per	He	Ir-Tu /Med/Eu-Si
Lolium rigidum Gaud.	Poaceae	Ann	Th	Ir-Tu /Med
Lophochloa cristata (L.) Hyl.	Poaceae	Ann	Th	Ir-Tu /Med
Lophochloa pubsscens (Lam.)H.Scholz.	Poaceae	Ann	Th	Med
Melica minuta	Poaceae	Per	He	Med
Milium vernale M.Bieb.	Poaceae	Ann	Th	Med
Parapholis incurva (L.)C.E.Hubbard.	Poaceae	Ann	Th	Ir-Tu /Med
Phalaris minor Retza.	Poaceae	Ann	Th	Ir-Tu /Med
Phalaris paradoxa L.	Poaceae	Ann	Th	Ir-Tu /Med
Phalaris truncata Guss.	Poaceae	Per	He	Med
Phragmites australis (Cav.) Trin . ex Steud.	Poaceae	Per	Ge	Plur
Piptatherum coerulescens (Desf.) P.Beauv.	Poaceae	Per	He	Ir-Tu /Med
Piptatherum holcifome (Bieb)Roem.et Schult.	Poaceae	Per	He	Ir-Tu /Med
Piptatherum miliaceum (L.)Coss.	Poaceae	Per	He	Med
Poa annua L.	Poaceae	Ann	Th	Ir-Tu /Med/Eu-Si
Poa bulbosa L.	Poaceae	Per	Ge	Ir-Tu /Med/Eu-Si
Poa infirma Kunth.	Poaceae	Ann	Th	Med
Poa pentapolit ana H.Scholz.	Poaceae	Ann	Th	Med
Poa trivialis ssp sylvicola (Guss.)H.Lindb.f	Poaceae	Per	He	Ir-Tu /Med/Eu-Si
Poa vaginata Pamp.	Poaceae	Per	Ge	Med
Polypogon maritmus Willd.	Poaceae	Ann	Th	Ir-Tu /Med
Polypogon monspecliensis (L.)Desf.	Poaceae	Ann	Th	Ir-Tu /Med/Sa-Ar
Polypogon semiverticillatus (Forsk.)Hyl.	Poaceae	Per	He	Ir-Tu /Med

<i>Psilurus incurvus</i> (Gouan) Schinz et Thell.	Poaceae	Ann	Th	Ir-Tu /Med
<i>Schismus arabicus</i> Nees.	Poaceae	Ann	Th	Ir-Tu /Sa-Ar
<i>Setaria verticillate</i> (L.) P.Beauv.	Poaceae	Ann	Th	Plur
<i>Setaria adhaerens</i> (Forsk.)Chiov.	Poaceae	Ann	Th	Plur
<i>Setaria glauca</i> (L.) P.Beauv.	Poaceae	Ann	Th	Plur
<i>Sorghum halepensa</i> (L.)Pers.	Poaceae	Per	Ge	Trop
<i>Sporobolus virginicus</i> (L.) Kunth.	Poaceae	Per	He	Ir-Tu /Med/Eu-Si
<i>Stipa capensis</i> Thunb.	Poaceae	Ann	Th	Ir-Tu /Sa-Ar
<i>Trachynia distachya</i> (L.)Link.	Poaceae	Ann	Th	Ir-Tu /Med
<i>Trisetaria macrochaeta</i> (Boiss.)Mair.	Poaceae	Ann	Th	Sa-Ar
<i>Triticum compactum</i> Host.	Poaceae	Ann	Th	Trop
<i>Vulpia ciliata</i> Dumort.	Poaceae	Ann	Th	Eu-Si/Med/Ir-Tu
<i>Vulpia bromoidea</i> (L.)S.F.Gray	Poaceae	Ann	Th	Eu-Si/Med/Trop
<i>Vulpia inops</i> (Del.) Hackel.	Poaceae	Ann	Th	Med
<i>Vulpia ligustica</i> (All.) Link.	Poaceae	Ann	Th	Med