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Herbaceous Vegetation Cover Analysis of Selected Sites in Jordan (Research Note)

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ABSTRACT

Five selected sites representing two biogeographical regions and five different vegetation types in Jordan were studied. Herbaceous vegetation were surveyed using the line transect. A total of 50 quadrat units (1m sq. each) per site were sampled along a ten fifty-meter-line transects with 5 quadrat units per line. Herbaceous vegetation total cover and maximum plant height, total number of individuals of each species and number of species were recorded. The analysis of the surveyed sites included species composition, species frequencies, abundances and Importance Value (IV). Analysis revealed that three to four families constituted more than 50% of the relative abundance of the total families in each site. Asteraceae was the most abundant family in all sites and had the highest IV. Other families that showed high abundance and IV values include, Leguminosae, Labiatae and Gramineae. Highest coverage, height, number of species, number of families and number of individuals have been recorded in Alouk and Na'ur areas, representing the deciduous oak and non-forest Mediterranean vegetation types, respectively. Dana and Adaseyeh had the lowest values. Only few species in each site contributed a major percent of the total abundance. Identifying the species with the highest IV values in each family at each of the five sites showed that these herbaceous vegetation types exhibit diverse array of species.

Keywords: Herbaceous vegetation cover, Jordan, Biogeographical regions.

1. INTRODUCTION

Jordan is a small and relatively semi-land-locked country. However, it enjoys tremendous ecological features of regional as well as global significance. The ecological importance of Jordan lies within its geographical location, climatological and geological formations (GCEP, 2000a).

Four main factors do contribute to the country's ecology (Eig, 1946, Al-Eisawi, 1985, 1997, GCEP, 2000a, 2000b). These are topography and altitude, rainfall, temperature and soil types. As a result, four biogeographical regions are recognized in Jordan (Al-Eisawi, 1985; Long, 1959). The Mediterranean Region; which includes almost all the mountain ranges occurring in the country and the soils are of the types *Terra rosa* and *Rendzina* which support forest climax of *Pinus halepensis* (wild Pine), *Quercus calliprinos* (ever-green Oak), *Quercus ithaburensis* (deciduous Oak), *Juniperus phoenica* (Phoenician Juniper). The second is the Irano-Turanian region; which surrounds all of the Mediterranean region except in the north. The soil is mostly poor, eroded and of the calcareous or loess type. This soil is moderately productive and best used for moderate herbivory. The Saharo-Arabian region comprises the majority of the country and borders the Irano-Turanian on the east. The soil is very poor and mostly of the hammada type with some sandy, saline soils or mud flats. The fourth region is the Sudanian (Sub-Tropical) region which comprises the Rift Valley, including the Dead Sea area, Wadi Araba, Aqaba and part of Wadi Rum, and the soil is mostly sandy and saline soils.

Thirteen vegetation types are recognizable in Jordan (Al-Eisawi, 1985). Some types are strictly confined to one of the bioclimatic regions. For example, forest climax occurs only within the Mediterranean region, while Steppe vegetation, on the other hand, is confined to the Irano-Turanian region. Tropical and Acacia woodlands occur at the sub-tropical region. Hammada vegetation occurs predominantly at the Saharo-arabian region.

Various studies regarding plant species composition and habitat description and vegetation community analysis (Al-Eisawi, 1982, 1985, 1997; Kurschner, 1986; Poore and Robertson, 1964) were mostly based on

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Table 1: Comparison between the different study sites (Al-Eisawi, 1985).

Locality	Biogeographical Region	Altitude , Temperature, rainfall	Bioclimatic Subdivision	Soil Type	Vegetation Type/ Characteristic species
Adaseyeh	Irano-Turanian	500-600m, 1-32 °C, 150mm	Arid Mediterranean, Warm variety	Mostly calcareous	Steppe vegetation / *Retama raetam*
Na'ur	Mediterranean	Variable, 3-30 °C, 500mm	Semi-Arid Mediterranean, Warm variety	Brown soil	Non- forest vegetation/ *Sarcopoterium spinosum*
Alouk	Mediterranean	600-700m, 4-32 °C, 400mm	Arid Mediterranean, Warm variety	Mostly yellow soil	Deciduous Oak forest / *Quercus ithaburensis*
Sakeb	Mediterranean	700-1000 m, 4-30 °C, 600mm	Sub-humid Mediterranean, Warm variety	Mostly red soil	Northern evergreen Oak forest / *Quercus calliprinos*
Dana	Mediterranean	900-1100m, (-2)-26 °C, 50mm	Semi-Arid Mediterranean, Cool variety	Mostly red soil	Southern evergreen Oak forest / *Quercus calliprinos*

Table 2: Comparative analysis between the five sites in regard to species numbers, no. of individuals and largest families.

Site	No. of sp.	No. of families	No. of individuals	Max. height	Vegetation coverage
Adaseyeh	69	20	2276	30.5 cm	45 %
Na'ur	88	27	4089	43.0 cm	65 %
Alouk	99	24	8016	52.0 cm	70 %
Sakeb	71	21	3603	41.5 cm	50 %
Dana	81	22	1915	38.5 cm	40 %

qualitative assessment. However, studies attempting to quantitatively analyze vegetation in Jordan are few. This study aims at exploring and contrasting the herbaceous vegetation composition, distribution and abundance between the Mediterranean and Irano-Turanian Biogeographical regions and among different vegetation types within the Mediterranean region.

2. METHODOLOGY

Site Selection and Description

Five sites have been selected randomly for this analysis (Sakeb, Alouk, Na'ur, Dana and Adaseyeh) as presented in Table (1). These sites belong to different climatic divisions. Sakeb, Alouk, Na'ur and Dana areas represent the Mediterranean region where Adaseyeh represents the Irano-Turanian region. Moreover, the sites within the Mediterranean differ in terms of physical environment (soil, temperature, Altitude, rainfall). Accordingly, they show varied vegetations types. The study took place on site surveys conducted during the period 2003/2004.

Experimnetal Design

Herbaceous vegetation was sampled using the line transect technique (Barbour et al., 1987). For each site, ten fifty-meter-line transects were laid. At each line, 5 quadrat units (1m sq. each) were surveyed. This totals a 50 quadrat units per site. The measured parameters represent the average of the fifty quadrat units for the whole site.

Parameters measured were: herbaceous vegetation total cover and maximum plant height. In addition, total number of individuals of each species, number of species and their families and species composition. Moreover, these parameters were used to calculate Density (D), Relative Density (RD), Frequency (F), Relative Frequency (RF), Relative Abundance (RD) and the Importance Value (IV) using the following formulas (Barbour et al., 1987; Krebs, 1989; Hegazy et al., 1998):

Table 3: Summary of the parameters measured at each sampling site showing the most frequent families and their IV values and the most important species within each family. Adaseyeh area (*A*), Na'ur area (*B*), Alouk area (*C*), Sakeb area (*D*), Dana area (*E*).

A: Adaseyeh Sampling Site							
Family	**IV value (0-200)**	**Total No. of Species**	**Total No. of Individuals**	**Frequency (%)**	**Most important species**	**IV value (0-200)**	**Total No. of Individuals**
Asteraceae	55.92	17	690	11	*Filago desertorum*	12.08	189
Labiatae	24.03	5	283	18	*Salvia palaestina*	11.07	160
Leguminosae	21.09	9	210	10	*Trifolium stellatum*	12.36	134
Umbelliferae	19.78	7	211	11	*Eryngium creticum*	6.27	112
Boraginaceae	17.68	5	200	13	*Podonosma orientalis*	7.94	101
Crassulaceae	13.45	2	167	23	*Sedum caespitosum*	7.84	117
Gramineae	13.33	5	101	13	*Crepsis sp*	6.73	55
Caryophyllaceae	8.72	4	82	10	*Silene colorata*	3.46	48
Convolvulaceae	4.34	1	68	10	*Convolvulus dorycnium*	4.34	68
Scrophulariaceae	3.21	1	30	14	*Scrophularia deserti*	3.21	30
Cruciferae	3.08	2	21	08	*Carrichtera annua*	2.77	20

B: Na'ur Sampling Site							
Family	**IV value (0-200)**	**Total No. of Species**	**Total No. of Individuals**	**Frequency (%)**	**Most important species**	**IV value (0-200)**	**Total No. of Individuals**
Asteraceae	40.47	17	751	15	*Varthemia iphionoides*	9.52	227
Caryophyllaceae	27.37	6	547	27	*Paronychia sinaica*	17.33	391
Crassulaceae	17.30	2	453	36	*Sedum palaestinum*	11.38	310
Linaceae	16.28	2	461	29	*Linum pubescens*	15.00	437
Orobanchaceae	14.30	1	260	92	*Orobanche crenua*	14.30	260
Umbelliferae	12.21	7	152	10	*Chaetosciadium trichospermum*	8.25	189
Gramineae	11.99	11	215	07	*Vulpia myuros*	2.38	62
Liliaceae	10.51	4	225	15	*Asphodelus aestivus*	4.20	108
Leguminosae	9.93	7	194	09	*Vicia peregrina*	2.75	77
Labiatae	7.86	4	145	13	*Phlomis brachyodon*	3.56	68
Theligonaceae	5.87	1	141	28	*Theligonum cynocrambe*	5.87	141
Cruciferae	5.18	4	113	07	*Biscuetilla didyma*	4.10	104
Geraniaceae	3.96	3	56	10	*Erodium bulbosum*	1.62	24
Santalaceae	3.51	1	66	22	*Osyris alba*	3.51	66
Boraginaceae	2.88	4	40	06	*Podonosma orientalis*	1.28	24
Campanulaceae	2.67	1	74	10	*Legousia pentagonia*	2.67	74
Rosaceae	1.74	1	36	10	*Sarcopoterium spinosum*	1.74	36

C: Alouk Sampling Site							
Family	**IV value (0-200)**	**Total No. of Species**	**Total No. of Individuals**	**Frequency (%)**	**Most important species**	**IV value (0-200)**	**Total No. of Individuals**
Asteraceae	61.09	22	3118	15	*Senecio vernalis*	19.77	1421
Leguminosae	34.37	22	1257	13	*Trifolium spumosum*	4.48	142
Gramineae	23.18	11	805	18	*Hordeum bulbosum*	7.92	319
Theligonaceae	12.40	1	608	73	*Theligonum cynocrambe*	12.40	608
Cruciferae	12.26	4	421	27	*Isatis lusitanica*	5.05	241
Rosaceae	10.22	2	328	47	*Crataegus azarolus*	5.46	192
Rubiaceae	9.14	3	358	24	*Crucianella sp*	6.62	250
Umbelliferae	6.68	8	231	07	*Pimpinella cretica*	1.64	73
Geraniaceae	6.19	3	204	19	*Geranium columbinum*	3.09	142
Scrophulariaceae	5.42	2	165	26	*Parantucellia flavoiflora*	4.02	135
Caryophyllaceae	4.78	3	161	21	*Minuartia decipiens*	2.60	91
Euphorbiaceae	2.27	1	88	18	*Euphorbia peplis*	2.27	88
Crassulaceae	2.08	2	50	11	*Sedum microcarpum*	1.12	31
Liliaceae	1.76	2	36	10	*Ornithogallum narborense*	0.95	29
Cistaceae	1.42	1	20	18	*Helianthemum aegypticum*	1.42	20
Labiatae	1.33	4	25	04	*Phlomis brachyodon*	0.81	18
Dipsacaceae	1.23	1	28	13	*Scabiosa palaestina*	1.23	28
Malvaceae	1.09	1	29	11	*Alcea acaulis*	1.09	29
Santalaceae	0.52	1	18	04	*Thesium bergeri*	0.52	18

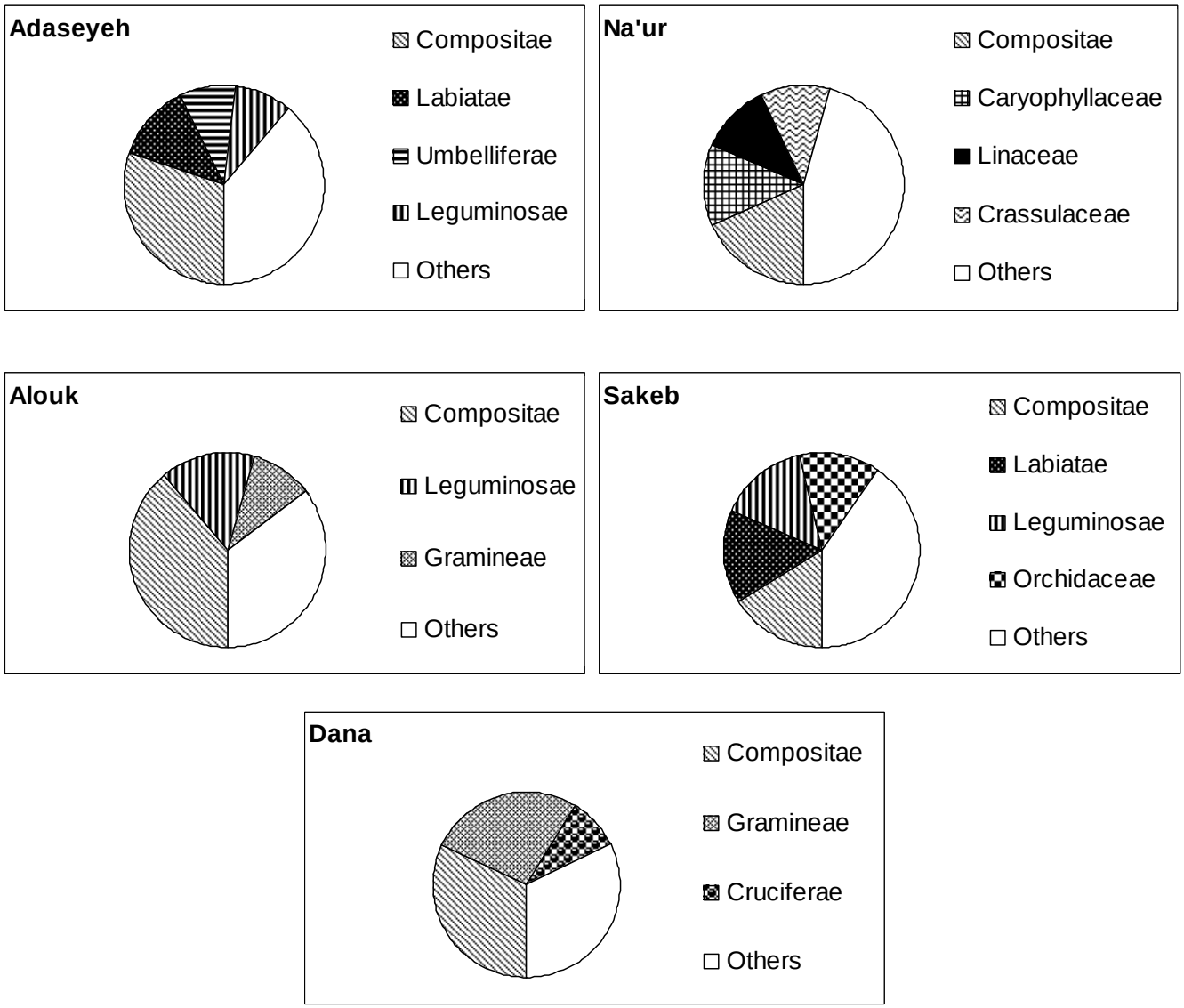
D: Sakeb Sampling Site							
Family	**IV value (0-200)**	**Total No. of Species**	**Total No. of Individuals**	**Frequency (%)**	**Most important species**	**IV value (0-200)**	**Total No. of Individuals**
Asteraceae	35.75	10	584	17	*Carlina hispanica*	16.07	450
Leguminosae	32.46	15	524	10	*Trifolium clypeatum*	13.60	349
Labiatae	29.25	4	561	30	*Ballota undulata*	11.51	274
Orchidaceae	18.37	2	486	21	*Orchis tridentata*	18.02	485
Cruciferae	13.77	5	285	10	*Hirschfeldia incana*	8.32	206
Gramineae	9.83	5	178	09	*Aegilops geniculata*	3.22	22
Caryophyllaceae	9.60	5	158	09	*Vaccaria pyramidata*	3.81	67
Plantaginaceae	8.32	2	194	13	*Plantago cretica*	7.85	189
Rhamnaceae	7.93	1	133	37	*Rhamnus palaestinus*	7.93	133
Anacardiaceae	6.50	1	117	29	*Rhus coriaria*	6.50	117
Umbelliferae	6.41	4	55	11	*Daucus carota*	2.40	16
Rubiaceae	4.67	3	39	10	*Cruciata articulate*	3.55	34
Boraginaceae	4.29	3	49	09	*Buglossoides tenuiflora*	1.60	34
Cistaceae	2.53	2	56	04	*Cistus creticus*	1.90	45
Resedaceae	2.08	1	28	11	*Reseda lutea*	2.08	28
Santalaceae	1.73	1	27	09	*Thesium bergeri*	1.73	27
Liliaceae	0.96	1	11	06	*Asphodelus aestivus*	0.96	11
Geraniaceae	0.38	1	2	03	*Erodium cicularum*	0.38	2
Rosaceae	0.38	1	2	03	*Sarcopoterium spinosum*	0.38	2

E: Dana Sampling Site							
Family	**IV value (0-200)**	**Total No. of Species**	**Total No. of Individuals**	**Frequency (%)**	**Most important species**	**IV value (0-200)**	**Total No. of Individuals**
Asteraceae	64.00	20	611	10	*Centaurea iberica*	17.61	219
Gramineae	39.96	11	545	08	*Avena weistii*	19.47	302
Cruciferae	15.36	6	176	07	*Diplotaxis harra*	5.42	92
Labiatae	15.1	9	100	07	*Ziziphora tinuior*	4.66	42
Liliaceae	10.73	4	111	08	*Urginea maritima*	6.65	86
Leguminosae	9.61	6	54	07	*Astragalus bethlehemiticus*	3.25	15
Caryophyllaceae	7.33	3	93	05	*Gypsophila arabica*	3.91	63
Boraginaceae	6.97	1	39	32	*Anchusa strigosa*	6.97	39
Dipsacaceae	5.80	3	46	07	*Pterocephalus plumosus*	2.90	20
Umbelliferae	4.71	3	35	07	*Astoma sesiliforme*	3.26	27
Santalaceae	4.14	2	36	08	*Thesium bergeri*	3.73	30
Cistaceae	3.25	2	15	08	*Helianthemum aegyptiacum*	2.53	13
Geraniaceae	2.70	1	34	06	*Erodium gruinum*	2.70	34
Rosaceae	1.44	1	4	08	*Amygdalus korschinskyi*	1.44	4
Scrophulariaceae	1.44	1	4	08	*Anarrhinum forskahlii*	1.44	4

Table 4: Comparative analysis between the five sites showing the most important families.

Site	**Largest families (no. species / family)**	**Relative Abundance (Individuals per Total Individuals) %**	**Frequency %**	**Density (Plant/ Total Quadrates)**	**RF %**	**RD %**	**IV (0 - 200)**
Adaseyeh	Asteraceae (690)	30.3	11.4	0.8	25.6	30.3	55.92
	Labiatae (283)	12.4	17.6	1.2	11.6	12.4	24.03
	Umbelliferae (211)	9.3	11.4	0.6	10.5	9.3	19.78
	Leguminosae (210)	9.2	10.0	0.5	11.9	9.2	21.09
Na'ur	Asteraceae (751)	18.4	15.1	0.9	22.1	18.4	40.47
	Caryophyllaceae (547)	13.4	27.0	1.8	14.0	13.4	27.37
	Linaceae (461)	11.3	29.0	4.6	5.0	11.3	16.28
	Crassulaceae (453)	11.1	7.3	4.5	6.8	11.1	17.30
Alouk	Asteraceae (3118)	38.9	15.4	3.2	22.2	38.9	61.09
	Leguminosae (1257)	15.7	12.9	1.3	18.7	15.7	34.37
	Gramineae (805)	10.0	18.2	1.6	13.1	10.0	23.18
Sakeb	Asteraceae (584)	16.2	17.1	1.7	19.6	16.2	35.75
	Labiatae (561)	15.6	30.0	4.0	13.7	15.6	29.25
	Leguminosae (524)	14.5	10.5	1.0	17.9	14.5	32.46
	Orchidaceae(486)	13.5	21.4	6.9	4.9	13.5	18.37
Dana	Asteraceae (611)	31.9	10.4	0.6	32.1	31.9	64.00
	Gramineae (511)	26.7	7.8	0.9	13.3	26.7	39.96
	Cruciferae (176)	9.2	6.7	0.6	6.2	9.2	15.36

Fig. 1: Relative percentage of the largest families in the studied sites.



D = no. of individuals (sp. A) / total units surveyed
RD = (density (sp. A) / total species densities) X 100
F = units of occurrence (sp. A) / total units surveyed
RF = (frequency (sp. A)/total species frequencies) X 100
RA = no. of individuals (family) / total no. of individuals (site) X 100

Then Importance Value (IV) will be calculated using the following formula (Bray and Curtis, 1957; Ayyad and Dix, 1964)

IV = RD + RF

Species, therefore, can be ranked based on their IV (ranging between 0 to 200) to determine the IV rank.

All the measurements including: no. of species, no. of families, no. of species in each family, total no. of individuals per family and the calculated values are reported.

3. RESULTS

Summary of the major herbaceous vegetation cover data for each of the sampled sites is presented in table (2). The highest number of species, individuals per species and maximum height and cover percent were recorded for Alouk study site. Na'ur study site showed the highest number of plant families recorded, while it came second after Alouk regarding the other parameters. Moreover, Adaseyeh study site had the lowest values regarding the number of species and families and the shortest vegetation, while Dana shows the lowest number of individuals but not the lowest number of species and families.

The analysis of the most important species in each of the five studied sites revealed that *Trifolium stellatum*,

Filago desertorum and *Salvia palaestina* make up about 35% of the total number of individuals in Adaseyeh area, While *Echinops polyceras, Sedum caespitosum, Anchusa aegyptiacum, Eryngium creticum* and *Podonosma orientalis* were present but less abundant. *Echinops polyceras, Erodium gruinum, Sedum caespitosum, Eryngium creticum* and *Podonosma orientalis* were present but less abundant (Table 3 A). *Paronychia sinaica, Linum pubescens, Orobanche crenua, Sedum palaestinum, Varthemia iphionoides* and *Chaetosciadium trichospermum* were the largest species in Na'ur area. These six species constitute more than 50% of the total number of individuals. Other less abundant species include, *Sedum rubens, Theligonum cynocrambe, Ornithogallum montanum, Asphodelus aestivus, Minuartia mediterranea, cichorium pumilum* and *Biscuetilla didyma* (Table 3 B).

In Alouk area, *Senecio vernalis, Crepis bulbosa, Theligonum cyanocrambe, Hordeum bulbosum* and *Picris cyanocrambe* add up to more than 40% of the total number of individuals and other less abundant species, that include Seedlings of *Crataegus azarolus, Isatis lusitanica Carlina hispanica, Trifolium stellatum, Trifolium spumosum, Sarcopoterium spinosum,* and *Avena longilumis* (Table 3 C). While *Orchis tridentate, Carlina hispanica, Trifolium clypeatum, Ballota undulata* and *Salvia palaestina,* comprise more than 50% of the total number of individuals in Sakeb area. *Hirschfeldia incana, Plantago cretica, Rhus coriaria, Rhamnus palaestinus, Crupina crupinastrum, Ziziphora tinuior* and *Crepis aspera* were also present but with less abundance (Table 3 D). In Dana area, more than 35% of the total number of individuals belonged to species *Avena weistii, Centaurea iberica, Tragopogon collinus* and *Catapodium rigidum.* Other species of less abundance include, *Urginea maritima, Notobasis syriaca, Anchusa strigosa, Diplotaxis harra, Biscuetilla didyma, Filago pyramidata* and *Ziziphora tinuior* (Table 3 E).

Further analysis of the number of individuals in each family (most abundant) were tabulated, and the most important families within each site were recorded and graphed (Table 4, Fig 1). In general, three to four major families comprise more than 50% of the relative abundances in each of the studied sites. The Adaseyeh area, which represents the Irano-Turanian region, was dominated by individuals belonging to the families of Asteraceae, labiatae and umbelliferae. Na'ur area, that belongs to the Mediterranean non-forest vegetation, was dominated by members that belong to the families of Asteraceae, caryophyllaceae, linaceae and crassulaceae. Moreover, the Alouk area, which represents the Mediterranean deciduous oak forest region, was dominated by individuals belonging to the families of Asteraceae, leguminosae and gramineae. While the individuals belonging to families of Asteraceae, labiatae, leguminosae and orchidaceae were dominant in Sakeb area that represents the Northern Mediterranean evergreen oak forest. Finally, Dana area, whish belongs to the Southern Mediterranean oak forest, was dominated by individuals of the Asteraceae, gramineae and cruciferae families.

4. DISCUSSION AND CONCLUSIONS

The current study represents an attempt to quantify the differences between herbaceous vegetation types present in Jordan. The analysis showed a variability of the herbaceous vegetation composition existing at the studied sites. This variability is expected to occur as a result of the changes in habitat topography, climate and edaphic conditions existing at the study sites and as noted by many previous studies (Al-Eisawi, 1985; Long 1957; Poore and Robertson, 1964; Zohary, 1962).

The general Mediterranean areas showed the highest diversity in terms of no. of families and no. of species. Dana, although considered a representative to Mediterranean region of southern forests, it shows the lowest number of individuals but not the lowest number of species and families. This agrees with previous assumptions that Mediterranean regions supports higher diversity due to favorable climatic condition. Irano-Turanian region, represented by Adaseyeh in this study, had relatively the lowest no. of different species and families.

The variability between the five sites persisted within all measured parameters including the herbaceous vegetation cover, maximum height, no. of individuals, no. of families and no. of species. Moreover, within each site, few families constituted more than 50% of the total abundance and a unique composition of families emphasizing the variability exists among these sites.

Most of plant families are represented in all of the five sites and the study focuses on the most frequent families. Differences within the sites that belong to the Mediterranean region, attributed to the prevailing bioclimatic conditions, are exacerbated by the level of disturbances these sites have experienced (Al-Eisawi,

1994). Taimeh (1995) and Disi (2003) indicated various reasons threatening the vegetation cover and biodiversity in Jordan. Among these are destruction of habitats, urbanization and recreational activities and tourism, expansion of agricultural projects and mal agricultural projects, uncontrolled grazing, deforestation and land fragmentation.

None of the studied sites are pristine due to the current land use practices exist in many natural areas in Jordan, such as deforestation and grazing (Na'ur and Dana areas), mining (Adaseyeh area), expansion of agricultural areas (Na'ur, Sakeb and Alouk area) and urban development (in all sites).

The most frequent families were the most important families based on the calculations used in this study (Bray and Curtis, 1957; Ayyad and Dix, 1964). Other formulae have been developed to take into account the individual coverage (Curtis and McIntosh, 1951; Lindsey, 1956; Barbour et al., 1987) and therefore, neither family or species can be totally confirmed of being the one with the highest importance value. However, we still can incorporate our visual observations of the percent cover of some indicative species such as *Sarcopoterium spinosum* in Na'ur, *Cistus creticus* in Sakeb or *Retama raetam* in Adaseyeh, which may put them as the leading species with the highest Importance Values.

In conclusion, Asteraceae constituted the largest family in all sites. This large family has a vast cosmopolitan distribution and it's expected to be found in most habitats. Many of which have weedy growth that is boosted in response to disturbance and clearance of natural vegetation.

Other smaller families showed high frequencies such as orobanchaceae and orchidaceae in Na'ur and Sakeb areas, respectively. The high frequency of the parasitic members of the family orobanchaceae can be attributed to expansion of agricultural fields in Na'ur area.

Most of orchids in Jordan have been recorded from the northern forests (Al-Eisawi, 1986). Orchids are restricted to the Mediterranean vegetation in the country, in particular the forest in the northern mountain ranges. only two species occur outside this range. These rare plant species require essential microclimatic conditions of shade and cooler temperature which is provided by the natural forest habitats. The clearance of forests in parts of Jordan, especially in the north, can lead to loss of such rare species.

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دراسة الغطاء النباتي العشبي لبعض مناطق الأردن (ملحوظة علمية)

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ملخص

تم اختيار خمس مناطق تمثل خمسة أنماط نباتية، وتقع ضمن اثنتين من المناطق الجغرافية الحيوية في الأردن لهذه الدراسة. باستخدام وحدة الخط و بحبل طوله خمسون متراً تم وضع هذه الحبال في عشرة مواقع عشوائياً، وعلى امتداد كل حبل تم وضع خمسة مربعات (مساحة الواحد1 كم^2) لدراسة الغطاء النباتي العشبي، ويتضمن ذلك: الغطاء النباتي، وأقصى ارتفاع للنبات، والعدد الكلي للأفراد من كل نوع، وعدد الأنواع. وتم حساب تركيبة الأنواع النباتية وعائلاتها، ونسبة تكرار الجماعات ووفرتها، وحساب قيمة الأهمية (IV).

بينت نتائج التحاليل أن هناك 3-4 عائلات سائدة، وتكون ما يزيد عن 50% من العائلات النباتية الموجودة في كل موقع. العائلة المركبة *Asteraceae* كانت الأكثر وفرة في كل المواقع، واحتلت المرتبة الأولى في قيمة الأهمية IV. ومن العائلات الأخرى التي أظهرت قيماً عالية: العائلة النجيلية *Gramineae*، والعائلة الشفوية *Labiatae*، والعائلة البقولية *Leguminosae*. أعلى قيم للغطاء النباتي، وأقصى ارتفاع للنبات، والعدد الكلي للأفراد من كل نوع وعدد الأنواع تم تسجيلها في مناطق العالوك وناعور التي تمثل غابة البلوط متساقط الأوراق ونمط نبات حوض المتوسط الخالي من الغابات بالتوالي. مناطق ضانا والعدسية أظهرت اقل القيم للغطاء النباتي، وأقصى ارتفاع للنبات، والعدد الكلي للأفراد من كل نوع وعدد الأنواع.

وأظهر القليل من الأنواع النباتية نسبة عالية من الوفرة الكلية للغطاء النباتي، كما أظهرت النتائج ان الأنماط النباتية في كل موقع تحتوي على مجموعة متنوعة من الأنواع النباتية التي لها قيمة عالية.

الكلمات الدالة: الغطاء النباتي العشبي، الأردن، المناطق الجغرافية الحيوية.

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