



STUDIES ON PLANT COVER OF WADI UMM EL-RAKHAM IN THE NORTHWESTERN COAST OF EGYPT

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ABSTRACT

The present investigation was carried out to study the phytosociological characters of the range land in Wadi Umm El-Rakham, in the Northwestern Coast of Egypt during spring 2004 and fall 2005 seasons. Thirty eight plant species belong to 17 families were found in Wadi Umm El-Rakham. Eighteen species were annuals and 20 species were perennials. A total of 18 species were palatable, the rest of plant species were unpalatable. Among annulus, 11 species were palatable, whereas among perennials seven species only were palatable. Fresh and dry foliage yield, species density, frequency, herbage cover and the importance value as well as their relative values were determined in different locations in the Wadi (i.e. top, ridge and Wadi bed). The highest values of the above mentioned traits were recorded in the Wadi bed location during spring season of both years 2004 and 2005. Meanwhile, the lowest values of all these traits were recorded in the Wadi top location. Significant interactions were noticed among the studied factors i.e. years, locations and seasons in Wadi bed location during spring season of both years.

Key Words: Range plants, frequency, density, cover, fresh and dry forage yields

INTRODUCTION

Egypt is a part of the arid region and despite the fact that the natural plant cover of Egyptian deserts is quite low and scattered; the flora in the North West Coast is relatively rich and diverse. The natural range is considered the main source of animal feedstuff in the

Northwestern Coast. Due to poor management and environmental impacts, the native ranges are deteriorated and seriously depleted. The region is known as one of the highest number of sheep and goats in Egypt. The range vegetation can be described as open shrub vegetation, characterized by sparse and slightly sparse stands of semi-shrubs with a cover of ephemerals of varying density which increase in depressions (Wadis = dry river valleys). The natural range vegetation depends mainly on rainfall, which varies greatly from year to year and in its duration. The various range types are closely associated with soil and climatic characters. The grazing ecosystem is complex with interacting biotic, edaphic, and climatic factors, confined with human intervention, which in turn reflects varied social and economic influences. Range productivity depends on various factors as climate, soil, botanical composition, vegetation structure and type and intensity of management, e.g. grazing patterns, stocking rates and wild life. Climatic factors such as precipitation, light, temperature, relative humidity and edaphic factors such as soil topography, texture and fertility are the most important factors affecting on natural plant distribution and the amount of moisture which the vegetation will receive. Many investigators studied the Wadis vegetation, as affected with locations and seasonal effects (Girgis and Desouky (1977); Girgis and Ahmad (1985); El-Kady and Sadek (1992). Also, yield measurements and plant identification were recorded under different range Locations; Shahba (1994); Fossati *et al.* (1999); Mashaly (2001); El-Toukhy *et al.*, (2002) and El-Morsy (2002).

The present study is a phytosociology of the natural vegetation in Wadi Umm El-Rakham in Northwestern Coast of Egypt. The aim of this study was to survey, identify and to assess range managements and productivity of natural vegetation in Wadi Umm El-Rakham in Northwestern Coast of Egypt.

MATERIALS AND METHODS

This study was conducted at the North Westren Coast (NWC) of Egypt in Wadi Umm El-Rakham (about 40 km west Marsa Matruh) during the period from spring 2004 and fall 2005 seasons under rainfed conditions to study the productivity of native plants under the effect of locations, growing seasons and years. The studied area lied

between latitudes 31° 21' 55 " to 31° 22' 13" N, longitudes 27° 00' 490" to 27 ° 00' 58" E.

Climate of the studied area is warm coastal desert belongs to the Mediterranean coastal region of Egypt. Generally, the rain occurs during winter (from September to April) and characterized by great fluctuation in distribution, intensity and annually. The rains fall and most of the days are sunny. The relative humidity in the coastal belt is generally high especially during summer. The monthly variation of some climatic factors for Mersa Matrouh station is shown in Table (1).

Table (1): The meteorological data of Wadi Umm El-Rakham 2004 and 2005.

year	2004					2005				
	Average			R.H.	Rainfed	Average			R.H.	Rainfed
	Temperature (°C)					Temperature (°C)				
Month	Max.	Min.	Mean	%	mm.	Max.	Min.	Mean	%	mm.
January	17.50	9.10	13.30	62	39.60	18.27	10.27	14.27	62	44.00
February	19.00	10.00	14.50	62	19.00	17.80	9.53	13.67	59	12.00
March	20.43	12.20	16.32	62	2.00	20.77	11.57	16.17	56	6.00
April	22.83	12.63	17.73	62	0.40	21.97	13.80	17.89	59	1.00
May	25.39	15.50	20.43	63	0.00	25.17	16.13	20.65	57	0.00
June	28.07	18.43	23.25	67	0.00	27.07	19.03	23.05	66	0.00
July	30.80	22.20	26.50	67	0.00	29.05	21.20	25.13	71	0.00
August	29.77	22.53	26.15	67	0.00	30.37	22.87	26.62	69	0.00
September	29.27	20.07	24.67	64	0.00	29.87	21.90	25.89	65	0.00
October	27.43	18.53	22.98	59	0.00	25.70	18.67	22.18	61	5.00
November	23.97	16.13	20.05	61	14.40	23.47	15.47	19.47	61	16.00
December	19.33	11.23	15.28	63	22.10	19.57	11.37	15.47	67	21.00
Mean	24.48	15.71	20.10	63.3	97.50	24.09	15.98	20.04	63	105

*Source: Meteorological Authority, Cairo

R.H. % = Relative humidity (%)

Soil samples were collected from the different locations of Wadi Umm El-Rakham (top, ridge and bed) and mechanical analyses (Table 2) were conducted using the international pipette method as described by Soil Conservation Service (1984). Chemical composition of the soil saturated extract (Table3) were carried out according to Jackson (1956).

Table (2): Soil physical analysis of experimental location in Wadi Umm El-Rakham

Location	Depth (cm)	Particle size distribution (mm) %				Class texture
		Coarse Sand (1-0.5)	Fine Sand (0.25-0.1)	Silt (0.05-0.002)	Clay < 0.002	
Wadi top	0-30	26.23	39.85	25.31	8.61	Sandy loam
Wadi ridge	0-30	25.72	44.12	20.60	9.56	
Wadi bed	0-30	18.32	43.51	22.18	15.99	
	30-60	12.65	47.40	23.33	16.62	

Table (3): Soil chemical analysis of experimental location in Wadi Umm El-Rakham

Location	Depth (cm)	pH	CaCO ₃ %	Anions (mg / L)		Cations (mg / L)			
				So ⁻	Cl ⁻	Ca ⁺⁺	Mg ⁺⁺	Na ⁺	K ⁺
Wadi top	0 – 30	7.94	33.65	0.325	9.21	2.75	15.25	5.12	0.89
Wadiridge	0 – 30	7.75	32.14	0.260	4.54	3.85	30.65	2.59	0.92
Wadi bed	0 – 30	7.88	30.26	0.417	5.5	2.31	18.65	3.48	0.64
	30 -60	7.93	29.84	0.397	5.1	2.43	17.86	3.22	0.60

Ten list and clip quadrates (5X5 m of each) were randomly distributed within each of the three locations (top, ridge and bed of the Wadi) and were used for the phytosociological analysis as well as far pasture measurements.

1. Fresh foliage (forage) yield/m²
2. Dry foliage (forage) yield (Fresh and dry foliage in g/m² were estimated).

Pasture measurements were done according to Mueller-Dombois & Ellenberg, 1974. as follows:

3. Density = (number of individuals) / (area sampled)
4. Relative density = (density for a species) / (total density for all species) x 100
5. Frequency = (number of sampled quadrates in which species occurs) / total number of quadrates sampled)
6. Relative frequency = (frequency value for a species) / (total quadrate area) x 100
7. Cover = (total of quadrate area for a species) / (total quadrate area) x 100
8. Relative cover = (total of quadrate area for a species) / (total of quadrate area for all species) x 100
9. Importance value = Relative density + Relative frequency + Relative cover

The importance value (IV) was determined according to Ludwig & Reynolds (1988) by calculating sum of relative density, relative frequency and relative cover for different species

Plant species and families were fully identified to the family level, and named according to Täckholm (1974) updated by Boulos, 1995.

Randomize complete blocks design was used. The collected data were statistically analyzed using the appropriate analysis of variance as described by Gomez and Gomez (1984). Means of treatments were compared by using least significant difference (LSD) at 5% probability.

RESULTS AND DISCUSSION

Floristic composition

As shown in Table (4) 16 families of 38 plant species were recorded in a grazing area of Wadi Umm El-Rakham during the period from spring 2004 and fall 2005 seasons.

There were eight species belonging to Asteraceae, four species for each of Brassicaceae, Boraginaceae, Fabaceae and Poaceae and

Table (4): Florestic composition of Wadi Umm El-Rakham vegetation during the period of spring 2004 and fall 2005 seasons.

No.	Family name	Scientific name	Vernacular name	Palatability	Life duration
1	Apiaceae	<i>Deverra tortuosa</i>	Qozzaah	Up	Pr
2	Araceae	<i>Arisarum vulgare</i>	Reinish	P	Pr
3		<i>Achilla santolina</i>	Beeithraan	Up	Ann
4		<i>Anacyclus alexandrinus</i>	Sorret El-Kabsh	P	Ann
5		<i>Carduncellus eriocephalus</i>	Kharshoof	up	pr
6	Asteraceae	<i>Centaurea alexandrina</i>	Moraar	up	pr
7		<i>Chrysanthemum coronarium</i>	Oqhowaan	Up	Ann
8		<i>Scorzonera alexandrina</i>	Dabbaah	Up	Pr
9		<i>Silybum marianum</i>	Shoak El-Gamal	Up	Pr
10		<i>Echiuops spinosissus</i>	Qadaad	Up	Ann
11	Boraginaceae	<i>Heliotropium bacciferum</i>	Libbeid	Up	Pr
12		<i>Echium sericeum</i>	Saaq El-Hamam	P	Pr
13		<i>Brassica tiurnefortii</i>	Shilltaam	P	Ann
14	Brassicaceae	<i>Cardaria draba</i>	Lisli	P	Pr
15		<i>Erucaria pinnata</i>	Seleikh	P	Ann
16		<i>Moricandia nitens</i>	Rakham	P	Ann
17	Caryophyllaceae	<i>Gymnocarpus decandrum</i>	Garad	P	Pr
18	e	<i>Herniaria hirsuta</i>	Omm lebbeid	Up	Ann
19	Chenopodiaceae	<i>Anabsis articulata</i>	Agram	Up	Pr
20	e	<i>Atriplex halimus</i>	Qataaf	P	Pr
21		<i>Halocylon salicornicum</i>	Rimth	Up	Pr
22	Boraginaceae	<i>Noaea mucronate</i>	ShoakEl-Hanash	Up	Pr
23		<i>Salsola vermiculata</i>	Khreiza	Up	Pr
24		<i>Lotus arabicus</i>	Gatb	Up	Ann
25	Fabaceae	<i>Trifolium tomentosum</i>	Qart	p	Ann
26		<i>Trigonella stellata</i>	Helba	p	Ann
27		<i>Vicia monantha</i>	Gharanboush	P	Ann
28	Lamiaceae	<i>Marrubium alysson</i>	Robiea	Up	Ann
29	Liliaceae	<i>Asphodelus microcarpus</i>	Basal El-Onsal	Up	Pr
30		<i>Aegilops kotschyi</i>	Shaer El-Faar	P	Ann
31	Poaceae	<i>Avena sativa</i>	Zommer	P	Ann
32		<i>Cynodon dactylon</i>	Nigeel	P	Pr
33		<i>Hordeum maritimum</i>	Shaer barri	P	Ann
34	Ranunculaceae	<i>Adonis dentata</i>	Na'ab al gamal	Up	Ann
35	Resedaceae	<i>Reseda decursiva</i>	Rigl El-Ghraab	P	Ann
36	Solanceae	<i>Lycium shawii</i>	Awsage	P	Pr
37	Thymelaeaceae	<i>Thymelaea hirsuta</i>	Methanan	Up	Pr
38	Zygophyllaceae	<i>Pegoanum harmala</i>	Harmal	Up	Pr

P = Palatable Up = Unpalatable Ann = Annual Pr = Perennial

two for each of *Boraginaceae*, *Caryophyllaceae* and *Chenopodiaceae*. The rest families have one species for each. It was noticed that 18 species were annuals and 20 species were perennials. There were 18 palatable species and the rest species were unpalatable. Among annuals, 11 species were palatable and seven were unpalatable. While, among perennials, seven species were palatable and 13 were unpalatable.

High numbers of unpalatable and spiny plant species indicate the grazing pressure to which Wadi Umm El-Rakham is exposed. Finally, the dominance of *Asteraceae* indicates the range deterioration and dominance of unpalatable species.

Fresh foliage (herbage) yield:

Tables (5a and 5b) show the values of foliage yield (g / m^2) of native plants in Wadi Umm El- Rakham from spring 2004 and fall 2005 seasons. Fresh foliage yield increased significantly with plants grown in spring season and decrease in fall of both years. Such decrease may be due to the lack of precipitation and absence of winter annuals. On the other hand, significant differences were detected among the three locations of the Wadi (top, ridge and bed) in spring. Locations within the Wadi under study had a significant and highest fresh forage yield especially during spring season which Wadi bed had the highest fresh forage yield (Table 5b), while in fall no significant differences were found among the different locations.

Table (5a): Fresh forage yield (g / m^2) as affected by year, year x season, year x location and year x season x location in Wadi Umm El-Rakham at spring 2004 and fall 2005 seasons.

Year	Season	Location			Season	Year mean
		Top	Ridge	Bed	mean	
2004	Spring	67.17	89.78	127.71	94.89	
	Fall	4.42	6.46	6.62	5.83	50.36
Location x Season		35.80	48.12	67.17	50.36	
2005	Spring	77.38	99.65	135.26	104.10	
	Fall	3.63	6.15	9.50	6.43	55.26
Location x Season		40.51	52.90	72.38	55.26	

LSD. $_{0.05}$ Years = 8.16

LSD. $_{0.05}$ Years x location = 14.12

LSD. $_{0.05}$ Years X seasons = 11.53

LSD. $_{0.05}$ Years X seasons x location =19.97

Table (5b): Fresh forage yield (g / m²) as affected by season, location and the interaction between season and location in Wadi Umm El-Rakham at spring 2004 and fall 2005 seasons.

Season	location			Mean
	Top	Ridge	Bed	
Spring	72.28	94.72	131.49	99.49
Fall	4.03	6.31	8.06	6.13
Total	38.15	50.51	69.77	52.81
LSD. _{0.05} season = 8.16	LSD. _{0.05} location = 9.19	LSD. _{0.05} season X location = 19.97		

No significant differences in fresh yield were observed between both years (Table 5a). Slight decrease in fresh forage yield was shown in the first year compared with the second one. The interaction was significant among locations x seasons, years x seasons, years x locations and years x season x locations during the studied years. Species in the top location in fall 2004 season had the lowest fresh yield.

Thymelaea hirsuta, *Atriplex halimus*, *Silybum marianum*, *Pegoanum harmala* and *Halocylon salicornicum* plants showed the highest fresh foliage yield (table 11). Most of these plants were unpalatable.

Dry foliage (herbage) yield

Data of the dry foliage (herbage) yield as affected by the study factors and their interactions are shown in Tables (6a, b, and 12); more or less similar to plants which was presented and discussed previously in fresh foliage yield with some variations. No significant differences among dry yield were observed between both years (Table 6a). The greatest dry yield was obtained at Wadi bed followed by Wadi ridge and Wadi top, respectively (Table 6b). This may be due to mild wind speed and more humidity in Wadi bed as well as more favourable edaphic conditions as compared with other studied locations. Also, the higher yield in Wadi bed may be due to more water content, this district is considered as a harvesting precipitation area. While the Wadi ridge and Wadi top had a soil surface erosion due to precipitation and wind velocity that formed the surface layer of seed

bed. Significant difference in dry foliage yield was noticed between wet (spring) and dry season (fall) in both years. Also, significant interaction was found between locations and seasons during the studied years.

Plant density

Plant density is an efficient expression for evaluating the numerical strength of species. Data in Tables (7a and b) indicate that native plants showed significant differences in plant density (m^2) which recorded its highest value of 12.45 plant / m^2 during spring season and 10.81 in Wadi bed whereas no significant differences were found between both years. Plant density had minimum value in dry season (fall), whereas interactions between studied factors were significant (Tables 7a and b). Plant density of species in the second year was greater than the first one. This may be due to the presence of adequate atmospheric circumstances for growing winter annuals and absence of summer annual plants.

Table (6a): Dry forage yield (g / m^2) as affected by year, interaction between year x season, year x location and year x season x location in Wadi Umm El-Rakham at spring 2004 and fall 2005 seasons.

Year	Season	Location			Season mean	Year mean
		Top	Ridge	Bed		
2004	Spring	18.98	27.08	35.45	27.17	14.92
	Fall	2.06	2.94	3.00	2.67	
Locations x Season		10.52	15.01	19.23	14.92	
2005	Spring	22.53	30.58	36.30	29.80	16.23
	Fall	1.70	2.75	3.51	2.65	
Locations x Season		12.12	16.67	19.91	16.23	

LSD. $_{0.05}$ Years = 2.20

LSD. $_{0.05}$ Years X seasons = 3.12

LSD. $_{0.05}$ Years x location = 3.82

LSD. $_{0.05}$ Years X seasons x location = 5.40

Table (6b): Dry forage yield (g /m²) as affected by season, location and interaction between season and location in Wadi Umm El-Rakham at spring 2004 and fall 2005 seasons.

Season	Location			Mean
	Top	Ridge	Bed	
Spring	20.76	28.83	35.88	28.49
Fall	1.88	2.85	3.26	2.66
Total	11.32	15.84	19.57	15.58

LSD. _{0.05} seasons=2.20 LSD. _{0.05} location = 2.70 LSD. _{0.05} seasons X location =3.82

Table (7a): Plant density (plant m⁻²) affected by year, interaction among year x season, year x location and years x season x location in Wadi Umm El-Rakham at spring 2004 and fall 2005 seasons.

Year	Season	Location			Season mean	Year mean
		Top	Ridge	Bed		
2004	Spring	11.23	5.16	18.64	11.68	
	Fall	1.06	1.13	2.23	1.47	6.58
Locations x Season Mean		6.15	3.15	10.44	6.58	
2005	Spring	13.03	6.08	20.55	13.22	
	Fall	1.28	1.33	1.78	1.46	7.34
Locations x Season Mean		7.16	3.71	11.17	7.34	

LSD. _{0.05} Years = 1.7

LSD. _{0.05} Years X seasons = 2.40

LSD. _{0.05} Years x location = 2.94

LSD. _{0.05} Years X seasons x location = 4.16

Table (7b): Plant density percentage (plant m⁻²) as affected by season, location and interaction between season and location in Wadi Umm El-Rakham at spring 2004 and fall 2005 seasons.

Season	Location			Mean
	Top	Ridge	Bed	
Spring	12.13	5.62	19.60	12.45
Fall	1.17	1.23	2.01	1.47 ^B
Total	6.65	3.43	10.81	6.96

LSD. _{0.05} seasons
=1.7

LSD. _{0.05} location
= 2.08

LSD. _{0.05} seasons X
location = 2.94

Asphodelus microcarpus, *Scorzonera alexandrina*, *Anacyclus alexandrinus*, *Cardaria draba* and *Lotus arabicus*; most plants species mentioned before showed the highest density in both years were unpalatable, these plants exposed to both grazing pressure and deterioration.

Relative density for native plants in Wadi Umm El-Rakham had the same direction of density (Table 13b).

Species with high density may be considered to be dominant (Maroof, 1978, Abou-Deya 1984, and El-Morsy 2002).

Plant cover

Tables (8a & b) and (14a & b) showed plant coverage percentage in grazing area of Wadi Umm El-Rakham; there were no-significant differences between both years (Table 8a). The shrubs *Lycium shawii*, *Thymelaea hirsute*, *Silybum marianum* and *Atriplex halimus* had the highest average values of plant cover and relative cover in both years followed by forbs then grasses (Table 14a & b). Relative cover showed the same trends (Table 14b)

Plant coverage in Wadi bed location was higher than the two other locations. This may be attributed to the favourable environmental conditions in the Wadi bed location. Plant species showed the highest cover during spring season, followed by sharp drop during the fall season.

Interaction between location, season and year for coverage percentage was significant. Plant cover percentage in Wadi bed location in spring 2005 season was the highest, whereas in Wadi top of fall 2004 was the lowest (Tables 8a and b). These results are matched with those of El-Morsy (2002).

The differences in vegetation cover between locations may be due to the variation between the canopy growth of individual species and different plant densities. These results are in accordance with those obtained by Rogers and King (1972) who mentioned that individual plant canopy and unequal intervals between adjacent plants may be the reason for differences in plant cover between locations.

Plant frequency

The frequency percentage in grazing area of Wadi Umm El-Rakham was higher in the spring as compared with fall season throughout years. Species in spring 2005 had the highest frequency

percentage (Tables 9a &b), this may be attributed to the environmental conditions

Table (8a): Plant cover percentage (plant m⁻²) as affected by year, interaction among year x season, year x location and year x season x location in Wadi Umm El-Rakham at spring 2004 and fall 2005 seasons.

Year	Season	Location			Season mean	Year mean
		Top	Ridge	Bed		
2004	Spring	18.05	29.25	36.83	28.04	
	Fall	8.99	12.71	13.26	11.65	19.85
Location x Season		13.52	20.98	25.05	19.85	
2005	Spring	19.50	31.91	39.63	30.35	
	Fall	9.36	13.50	14.77	12.54	21.45
Location x Season		14.43	22.71	27.20	21.45	

LSD_{.05} Year = 3.54

LSD_{.05} Year X season = 5.00

LSD_{.05} Year x Location = 6.13

LSD_{.05} Year X season x Location = 8.66

Table (8b): Plant cover percentage (plant m⁻²) as affected by season, location and interaction between season and location in Wadi Umm El-Rakham at spring 2004 and fall 2005 seasons.

Season	Location			Mean
	Top	Ridge	Bed	
Spring mean	18.78	30.58	38.23	29.19
Fall	9.18	13.11	14.02	12.10
Total	13.97	21.84	26.12	20.65

LSD_{.05}season =3.54

LSD_{.05} Location = 4.33

LSD_{.05} season X Location = 6.13

Table (9a): Plant Frequency percentage (plant m⁻²) affected by year, interaction among year x season, year x location and year x season x location in Wadi Umm El-Rakham at spring 2004 and fall 2005 seasons.

Year	Season	Location			Season mean	Year mean
		Top	Ridge	Bed		
2004	Spring	34.40	23.91	43.78	34.03	
	Fall	31.43	31.25	33.33	32.00	33.02
Location x Season		32.92	27.58	38.56	33.02	
2005	Spring	37.60	25.56	48.16	37.60	
	Fall	31.43	31.11	32.00	31.43	34.31
Location x Season		34.52	28.34	40.08	34.31	

LSD. _{0.05} Year = 0.39LSD. _{0.05} Year X season = 3.84LSD. _{0.05} Year x Location = 2.78LSD. _{0.05} Year X season x Location = 7.54

Table (9b): Plant density percentage (plant / m²) as affected by season, location and interaction between season and location in Wadi Umm El-Rakham from spring 2004 and fall 2005 season.

Season	Location			Mean
	Top	Ridge	Bed	
Spring	36.00	24.74	45.97	35.57
Fall	31.43	31.18	32.67	31.76
Total	33.72	27.96	39.32	33.67

LSD. _{0.05} season = 2.55LSD. _{0.05} Location = 4.08LSD. _{0.05} season X Location = 6.45

prevailing on this area which had increases in precipitation average of 97.5 mm and 105 mm in 2004 and 2005, respectively (Table 1).

Plant species of *Anacyclus alexandrinus*, *Hordeum maritimum*, *Brassica tiarnerfortii* and *Haloxylon salicornicum* had the highest percentage and most of these plants were annuals (Table 4 & 15a). On the contrary, the lowest frequency was recorded in *Herniaria*

hirsute and *Anabasis articulata*. Relative frequency had the same trend (Table 15b).

Generally, it could be concluded that plant species characterized by high frequency in Wadi bed than the ridge and the top, respectively, during the different seasons. This may be mainly due to great differences among locations in soil edaphic factor and physical properties (Tables 2&3). It means that soil of Wadi bed was capable to maintain least exposure to precipitation due to its highest depth than other locations and wind effect. Therefore plant seeds pushed into Wadi bed area to growing and the abundance of suitable humidity had a chance for seed flourishing.

Tag El-Din et. al. (1994) pointed to the influence of soil properties on the distribution of different plant communities. While, Sanford, et. al. (1990) concluded that the distribution of plants is largely determined by moisture availability and the activities of pastoralists and their herds rather than by soil or land form.

Importance value:

among species by studying the relative density, relative coverage and relative frequency for each species. Importance value provides information that could help in determining species from which habitat type is the most adapted and tolerant to environmental stresses.

Results in Table (10) showed the importance value of plant species in Wadi Umm El-Rakham. The highest IV was contributed by *Haloxylon salicornicum*, *Lycium shawii*, and *Thymelaea hirsute*, all these species are perennials, while, the lowest IV was perennial spp. *Trigonella stellata*, *Trifolium tomentosum* (annual plants) and *Arisarum vulgare* (perennial plant with out shoot system in summer and fall seasons) Table (10). These perennials showed high adaptation under Wadi Umm El-Rakham habitat conditions (varied topography, low content of soil CaCO_3 and salinity, and the soil pH ranged from neutral to

low alkalinity). This result was true in all seasons with various magnitudes. Mashaly (2002) defined four edaphic factors that affect the characteristics species, i.e.: soil texture, moisture availability, CaCO_3 and soil fertility.

Table (11): Fresh forage yield (g plant⁻²) of plant species as affected by year, Location and season in Wadi Umm El-Rakham at spring 2004 and fall 2005 seasons.

Scientific name	Spring 2004			Fall 2004			Spring 2005			Fall 2005		
	Top	Rid	Bed	Top	Rid	Bed	Top	Rid	Bed	Top	Rid	Bed
<i>Deverra tortuosa</i>	4.82	5.19	7.61	0.86	1.00	1.89	5.22	6.19	6.00	0.71	0.78	1.35
<i>Arisarum vulgare</i>	---	---	3.51	---	---	---	---	---	3.25	---	---	---
<i>Achilla santolina</i>	1.80	---	2.00	---	---	---	1.48	0.99	2.84	---	---	---
<i>Anacyclus alexandrinus</i>	3.61	---	4.18	---	---	---	3.94	0.87	5.18	---	---	---
<i>Carduncellus eriocephalus</i>	---	1.09	2.42	---	---	---	---	0.95	2.14	---	---	---
<i>Centaurea alexandrina</i>	4.49	3.59	4.35	---	---	---	4.62	3.21	3.00	---	---	---
<i>Chrysanthemum coronarium</i>	1.26	---	1.65	---	---	---	1.18	0.62	1.32	---	---	---
<i>Scorzonera alexandrina</i>	1.25	---	1.42	---	---	---	1.79	---	1.65	---	---	---
<i>Silybum marianum</i>	---	5.87	9.24	---	---	---	---	7.26	9.54	---	---	---
<i>Echium spinosissus</i>	4.68	---	5.02	---	---	---	4.43	---	5.64	---	---	---
<i>Heliotropium bacciferum</i>	---	3.29	3.80	---	---	---	---	4.09	3.19	---	---	---
<i>Echium sericeum</i>	---	2.78	---	---	---	---	---	2.18	1.46	---	---	---
<i>Brassica tjurnefortii</i>	0.96	---	1.38	---	---	---	1.46	---	2.29	---	---	---
<i>Cardaria draba</i>	2.45	---	2.00	---	---	---	1.69	---	1.78	---	---	---
<i>Erucaria pinnata</i>	---	---	1.57	---	---	---	---	---	2.22	---	---	---
<i>Moricandia nitens</i>	2.17	---	4.18	---	---	---	3.30	---	3.87	---	---	---
<i>Gymnocarpus decandrum</i>	3.06	4.81	4.36	0.10	0.28	0.16	4.46	4.90	3.69	0.09	0.25	0.15
<i>Herniaria hirsuta</i>	---	0.84	1.28	---	---	---	---	0.90	1.75	---	---	---
<i>Anabsis articulata</i>	6.11	3.90	6.63	---	---	---	5.00	4.19	6.93	---	---	3.10
<i>Atriplex halimus</i>	---	9.58	7.01	---	1.72	1.45	---	11.90	10.47	---	1.86	1.81
<i>Haloxylon salicornicum</i>	3.89	8.92	5.19	1.52	1.58	1.11	5.59	7.06	4.49	1.10	1.39	1.23
<i>Noaea mucronate</i>	4.49	5.18	4.15	0.57	0.44	0.41	4.91	6.30	4.22	0.62	0.47	0.46
<i>Salsola vermiculata</i>	---	3.39	3.07	---	0.07	0.04	---	2.48	2.52	---	0.05	0.04
<i>Lotus arabicus</i>	0.33	---	0.59	---	---	---	0.21	---	0.35	---	---	---
<i>Trifolium tomentosum</i>	---	---	0.37	---	---	---	---	---	0.58	---	---	---
<i>Trigonella stellata</i>	0.49	---	0.24	---	---	---	0.61	---	0.43	---	---	---
<i>Vicia monantha</i>	---	---	1.16	---	---	---	---	---	0.85	---	---	---
<i>Marrubium alysson</i>	---	5.60	4.22	---	---	---	---	6.02	4.88	---	---	---
<i>Asphodelus microcarpus</i>	5.18	4.41	4.73	---	---	---	7.06	3.83	6.22	---	---	---
<i>Aegilops koelschii</i>	0.42	0.27	0.30	---	---	---	0.22	0.38	0.35	---	---	---
<i>Avena sativa</i>	0.53	0.88	1.46	---	---	---	0.72	0.82	1.62	---	---	---
<i>Cynodon dactylon</i>	1.43	---	1.96	0.04	---	0.03	1.11	0.19	1.74	0.02	0.05	0.12
<i>Hordeum maritimum</i>	1.16	0.22	0.47	---	---	---	1.33	0.41	0.63	---	---	---
<i>Adonis dentata</i>	0.43	0.12	0.45	---	---	---	1.00	0.46	0.32	---	---	---
<i>Reseda decursiva</i>	---	1.60	2.77	---	---	---	---	2.20	4.02	---	---	---
<i>Lycium shawii</i>	3.24	10.75	4.05	0.24	0.28	0.34	4.19	12.31	5.18	0.27	0.39	0.36
<i>Thymelaea hirsuta</i>	4.24	3.82	9.24	1.09	1.09	1.13	5.20	4.72	8.44	0.83	0.91	0.97
<i>Pegoanum harmala</i>	4.68	3.68	9.68	---	---	---	6.36	4.22	10.21	---	---	---
Total	67.17	89.78	127.71	4.42	6.46	6.56	77.38	99.65	135.26	3.63	6.15	9.50

Rid = ridge in this table and the following

Table (12): Dry foliage yield of plant species (g m⁻²) as affected by year, Location, and season in Wadi Umm El-Rakham at spring 2004 and fall 2005 seasons.

Scientific name	Spring 2004			Fall 2004			Spring 2005			Fall 2005		
	Top	Rid	Bed	Top	Rid	Bed	Top	Rid	Bed	Top	Rid	Bed
<i>Deverra tortuosa</i>	2.09	2.20	3.28	0.51	0.62	1.22	2.41	2.97	2.94	0.42	0.45	0.70
<i>Arisarum vulgare</i>	---	---	0.63	---	---	---	---	---	0.59	---	---	---
<i>Achilla santolina</i>	0.28	---	0.30	---	---	---	0.22	0.15	0.40	---	---	---
<i>Anacyclus alexandrinus</i>	0.90	---	0.01	---	---	---	0.91	0.19	1.00	---	---	---
<i>Carduncellus erioccephalus</i>	---	0.21	0.47	---	---	---	---	0.17	0.42	---	---	---
<i>Centaurea alexandrina</i>	1.54	1.14	1.50	---	---	---	1.46	0.98	0.91	---	---	---
<i>Chrysanthemum coronarium</i>	0.22	---	0.28	---	---	---	0.21	0.11	0.22	---	---	---
<i>Scorzonera alexandrina</i>	0.18	---	0.18	---	---	---	0.22	---	0.19	---	---	---
<i>Silybum marianum</i>	---	2.05	3.10	---	---	---	---	2.54	3.15	---	---	---
<i>Echium spinosissus</i>	1.67	---	1.73	---	---	---	1.57	---	1.94	---	---	---
<i>Heliotropium bacciferum</i>	---	0.92	1.02	---	---	---	---	1.04	0.80	---	---	---
<i>Echium sericeum</i>	---	1.14	---	---	---	---	---	0.85	0.59	---	---	---
<i>Brassica tiarnerfortii</i>	0.17	---	0.23	---	---	---	0.25	---	0.37	---	---	---
<i>Cardaria draba</i>	0.39	---	0.35	---	---	---	0.30	---	0.29	---	---	---
<i>Erucaria pinnata</i>	---	---	0.61	---	---	---	---	---	0.85	---	---	---
<i>Moricandia nitens</i>	0.50	---	0.98	---	---	---	0.82	---	0.92	---	---	---
<i>Gymnocarpus decandrum</i>	1.25	1.94	1.70	0.06	0.18	0.07	2.01	2.16	1.54	0.05	0.15	0.09
<i>Herniaria hirsuta</i>	---	0.15	0.23	---	---	---	---	0.18	0.32	---	---	---
<i>Anabasis articulata</i>	1.28	0.86	1.30	---	---	---	1.02	0.82	1.25	---	---	0.68
<i>Atriplex halimus</i>	---	2.86	2.10	---	0.71	0.56	---	3.64	3.04	---	0.78	0.71
<i>Halocxylon salicornicum</i>	1.09	2.56	1.43	0.59	0.60	0.31	1.68	2.12	1.34	0.42	0.55	0.49
<i>Noaea mucronate</i>	1.80	2.00	1.61	0.29	0.23	0.21	1.93	2.51	1.66	0.32	0.24	0.23
<i>Salsola vermiculata</i>	---	0.71	0.61	---	0.02	0.04	---	0.53	0.58	---	0.01	0.01
<i>Lotus arabicus</i>	0.05	---	0.07	---	---	---	0.03	---	0.06	---	---	---
<i>Trifolium tomentosum</i>	---	---	0.05	---	---	---	---	---	0.07	---	---	---
<i>Trigonella stellata</i>	0.07	---	0.03	---	---	---	0.09	---	0.05	---	---	---
<i>Vicia monantha</i>	---	---	0.19	---	---	---	---	---	0.14	---	---	---
<i>Marrubium alysson</i>	---	1.57	1.16	---	---	---	---	1.72	1.37	---	---	---
<i>Asphodelus microcarpus</i>	1.22	1.03	1.06	---	---	---	1.55	0.86	1.35	---	---	---
<i>Aegilops kotschyi</i>	0.14	0.10	0.09	---	---	---	0.07	0.13	0.11	---	---	---
<i>Avena sativa</i>	0.15	0.26	0.39	---	---	---	0.20	0.23	0.40	---	---	---
<i>Cynodon dactylon</i>	0.30	---	0.45	0.02	---	0.02	0.28	0.06	0.38	0.01	0.02	0.05
<i>Hordeum maritimum</i>	0.29	0.05	0.10	---	---	---	0.33	0.09	0.16	---	---	---
<i>Adonis dentata</i>	0.07	0.01	0.07	---	---	---	0.18	0.07	0.05	---	---	---
<i>Reseda decursiva</i>	---	0.43	0.76	---	---	---	---	0.59	1.06	---	---	---
<i>Lycium shawii</i>	0.89	2.96	1.03	0.10	0.11	0.09	1.21	3.42	1.50	0.11	0.15	0.14
<i>Thymelaea hirsuta</i>	1.46	1.18	2.58	0.49	0.47	0.50	1.77	1.61	2.26	0.37	0.40	0.41
<i>Pegoanum harmala</i>	0.98	0.75	2.77	---	---	---	1.81	0.84	2.03	---	---	---
Total	18.98	27.08	34.45	2.06	2.94	3.00	22.53	30.58	36.30	1.70	2.75	3.51

Table (13a): Plant density (plant m⁻²) as affected by Location, season and year in Wadi Umm El-Rakham at spring 2004 and fall 2005 seasons.

Scientific name	Spring 2004			Fall 2004			Spring 2005			Fall 2005		
	Top	Rid	Bed	Top	Rid	Bed	Top	Rid	Bed	Top	Rid	Bed
<i>Deverra tortuosa</i>	0.40	0.46	0.42	0.22	0.31	0.33	0.69	0.43	0.44	0.36	0.34	0.40
<i>Arisarum vulgare</i>	---	---	0.32	---	---	---	---	---	0.38	---	---	---
<i>Achilla santolina</i>	0.49	---	0.52	---	---	---	0.42	0.02	0.60	---	---	---
<i>Anacyclus alexandrinus</i>	1.02	---	1.03	---	---	---	1.01	0.06	1.19	---	---	---
<i>Carduncellus eriocephalus</i>	---	0.42	0.60	---	---	---	---	0.52	0.73	---	---	---
<i>Centaurea alexandrina</i>	0.35	0.21	0.52	---	---	---	0.21	0.09	0.58	---	---	---
<i>Chrysanthemum coronarium</i>	0.62	---	0.84	---	---	---	0.64	0.02	1.01	---	---	---
<i>Scorzonera alexandrina</i>	2.39	---	2.25	---	---	---	3.25	---	2.23	---	---	---
<i>Silybum marianum</i>	---	0.17	0.27	---	---	---	---	0.21	0.30	---	---	---
<i>Echium spinosissus</i>	0.26	---	0.32	---	---	---	0.31	---	0.34	---	---	---
<i>Heliotropium bacciferum</i>	---	0.20	0.46	---	---	---	---	0.24	0.51	---	---	---
<i>Echium sericeum</i>	---	0.32	---	---	---	---	---	0.22	0.16	---	---	---
<i>Brassica tatarica</i>	0.48	---	0.53	---	---	---	0.52	---	0.66	---	---	---
<i>Cardaria draba</i>	0.43	---	1.03	---	---	---	0.50	---	1.11	---	---	---
<i>Erucaria pinnata</i>	---	---	0.18	---	---	---	---	---	0.22	---	---	---
<i>Moricandia nitens</i>	0.10	---	0.21	---	---	---	0.16	---	0.20	---	---	---
<i>Gymnocarpus decandrum</i>	0.12	0.15	0.23	0.05	0.08	0.06	0.11	0.19	0.25	0.07	0.11	0.06
<i>Herniaria hirsuta</i>	---	0.08	0.10	---	---	---	---	0.11	0.13	---	---	---
<i>Anabsis articulata</i>	0.20	0.24	0.29	---	---	---	0.21	0.24	0.30	---	---	0.03
<i>Atriplex halimus</i>	---	0.09	0.21	---	0.07	0.09	---	0.12	0.23	---	0.07	0.07
<i>Haloxylon salicornicum</i>	0.42	0.31	0.50	0.23	0.19	0.29	0.47	0.51	0.56	0.15	0.26	0.16
<i>Noaea mucronate</i>	0.30	0.23	0.37	0.12	0.13	0.51	0.36	0.49	0.41	0.14	0.11	0.37
<i>Salsola vermiculata</i>	---	0.19	0.23	---	0.01	0.02	---	0.22	0.21	---	0.01	0.11
<i>Lotus arabeus</i>	0.88	---	1.03	---	---	---	1.03	---	1.17	---	---	---
<i>Trifolium tomentosum</i>	---	---	0.33	---	---	---	---	---	0.37	---	---	---
<i>Trigonella stellata</i>	0.08	---	0.28	---	---	---	0.06	---	0.31	---	---	---
<i>Vicia monantha</i>	---	---	0.51	---	---	---	---	---	0.54	---	---	---
<i>Marrubium alysson</i>	---	0.82	0.85	---	---	---	---	0.91	0.90	---	---	---
<i>Asphodelus microcarpus</i>	0.86	0.35	1.05	---	---	---	1.00	0.39	1.05	---	---	---
<i>Aegilops kotschy</i>	0.62	0.22	1.02	---	---	---	0.68	0.09	1.04	---	---	---
<i>Avena sativa</i>	0.18	0.07	1.01	---	---	---	0.22	0.11	1.08	---	---	---
<i>Cynodon dactylon</i>	0.15	---	0.21	0.05	---	0.64	0.17	0.01	0.22	0.06	0.01	0.05
<i>Hordeum maritimum</i>	0.11	0.03	0.18	---	---	---	0.12	0.10	0.21	---	---	---
<i>Adonis dentata</i>	0.13	0.02	0.11	---	---	---	0.11	0.04	0.14	---	---	---
<i>Reseda decursiva</i>	---	0.02	0.05	---	---	---	---	0.03	0.07	---	---	---
<i>Lycium shawii</i>	0.21	0.21	0.09	0.20	0.19	0.10	0.28	0.21	0.08	0.19	0.19	0.22
<i>Thymelaea hirsuta</i>	0.36	0.30	0.4	0.19	0.15	0.19	0.44	0.40	0.51	0.31	0.23	0.31
<i>Pegoanum harmala</i>	0.07	0.05	0.09	---	---	---	0.07	0.10	0.11	---	---	---
Total	11.23	5.16	18.64	1.06	1.13	2.23	13.04	6.08	20.55	1.28	1.33	1.78

Table (14a): Herbage cover percentage of plant species (plant m⁻²) as affected by Location and season in Wadi Umm El-Rakham at spring 2004 and fall 2005 seasons.

Scientific name	Spring 2004			Fall 2004			Spring 2005			Fall 2005		
	Top	Rid.	Bed	Top	Rid	Bed	Top	Rid	Bed	Top	Rid.	Bed
<i>Deverra tortuosa</i>	1.07	2.00	2.01	1.10	1.31	1.44	1.26	2.13	2.16	1.19	1.30	1.69
<i>Arisarum vulgare</i>	---	---	0.03	---	---	---	---	---	0.04	---	---	---
<i>Achilla santolina</i>	0.14	---	0.19	---	---	---	0.12	0.08	0.26	---	---	---
<i>Anacyclus alexandrinus</i>	0.15	---	0.22	---	---	---	0.12	0.06	0.21	---	---	---
<i>Carduncellus eriocephalus</i>	---	1.18	2.42	---	---	---	---	1.20	2.36	---	---	---
<i>Centaurea alexandrina</i>	0.32	0.24	0.23	---	---	---	0.36	0.32	0.25	---	---	---
<i>Chrysanthemum coronarium</i>	0.09	---	0.13	---	---	---	0.09	0.04	0.15	---	---	---
<i>Scorzonera alexandrina</i>	0.26	---	0.34	---	---	---	0.10	---	0.08	---	---	---
<i>Silybum marianum</i>	---	3.15	5.12	---	---	---	---	3.67	5.00	---	---	---
<i>Echiops spinosissus</i>	0.19	---	0.26	---	---	---	0.22	---	0.30	---	---	---
<i>Heliotropium bacciferum</i>	---	0.49	0.64	---	---	---	---	0.53	0.77	---	---	---
<i>Echium sericeum</i>	---	0.17	---	---	---	---	---	0.19	0.13	---	---	---
<i>Brassica tiarnefortii</i>	0.67	---	1.01	---	---	---	0.70	---	0.88	---	---	---
<i>Cardaria draba</i>	0.39	---	0.57	---	---	---	0.51	---	0.63	---	---	---
<i>Erucaria pinnata</i>	---	---	0.16	---	---	---	---	---	0.14	---	---	---
<i>Moricandia nitens</i>	0.31	---	0.53	---	---	---	0.46	---	0.59	---	---	---
<i>Gymnocarpus decandrum</i>	0.94	1.11	1.38	0.40	0.31	0.26	1.33	1.26	2.00	0.37	0.32	0.19
<i>Herniaria hirsuta</i>	---	1.07	1.16	---	---	---	---	1.22	1.36	---	---	---
<i>Anabasis articulata</i>	0.22	0.29	0.41	---	---	---	0.30	0.27	0.44	---	---	0.24
<i>Atriplex halimus</i>	---	3.00	3.34	---	2.03	2.12	---	3.30	3.56	---	2.14	2.02
<i>Halocxylon salicornicum</i>	2.47	2.05	2.84	1.74	1.51	2.25	2.56	2.05	3.10	1.60	1.54	2.57
<i>Noaea mucronate</i>	1.04	1.11	1.30	0.98	1.00	1.14	1.00	1.21	1.67	1.00	1.04	1.23
<i>Salsola vermiculata</i>	---	0.04	0.11	---	0.07	0.05	---	0.07	0.11	---	0.10	0.07
<i>Lotus arabicus</i>	0.06	---	0.13	---	---	---	0.08	---	0.23	---	---	---
<i>Trifolium tomentosum</i>	---	---	0.11	---	---	---	---	---	0.03	---	---	---
<i>Trigonella stellata</i>	0.07	---	0.15	---	---	---	0.10	---	0.12	---	---	---
<i>Vicia monantha</i>	---	---	0.21	---	---	---	---	---	0.26	---	---	---
<i>Marrubium alysson</i>	---	1.00	1.29	---	---	---	---	1.24	1.40	---	---	---
<i>Asphodelus microcarpus</i>	1.38	2.01	2.00	---	---	---	1.26	2.14	1.84	---	---	---
<i>Aegilops kotschy</i>	0.08	0.03	0.16	---	---	---	0.12	0.02	0.11	---	---	---
<i>Avena sativa</i>	0.13	0.21	0.34	---	---	---	0.09	0.07	0.19	---	---	---
<i>Cynodon dactylon</i>	0.18	---	0.33	0.02	---	0.04	0.20	0.10	0.30	0.09	0.02	0.07
<i>Hordeum maritimum</i>	0.19	0.14	0.25	---	---	---	0.26	0.17	0.21	---	---	---
<i>Adonis dentata</i>	0.12	0.17	0.20	---	---	---	0.14	0.21	0.19	---	---	---
<i>Reseda decursiva</i>	---	0.08	0.07	---	---	---	---	0.10	0.10	---	---	---
<i>Lycium shawii</i>	3.92	4.70	2.02	2.00	3.48	2.18	4.00	5.00	3.08	2.51	2.99	2.41
<i>Thymelaea hirsuta</i>	3.13	4.49	4.34	2.75	3.00	3.78	3.39	4.65	4.54	2.60	4.05	4.28
<i>Pegoanum harmala</i>	0.53	0.52	0.83	---	---	---	0.73	0.61	0.84	---	---	---
Total	18.05	29.25	36.83	8.99	12.71	13.26	19.50	31.91	39.63	9.36	13.5	17.77

Table (15a): Frequency percentage of plant species as affected by Location and season in Wadi Umm El-Rakham at spring 2004 and fall 2005 seasons.

Scientific name	Spring 2004			Fall 2004			Spring 2005			Fall 2005		
	Top	Rid	Bed	Top	Rid	Bed	Top	Rid	Bed	Top	Rid	Bed
<i>Deverra tortuosa</i>	40	50	60	40	50	50	40	50	70	40	50	50
<i>Arisarum vulgare</i>	---	---	30	---	---	---	---	---	30	---	---	---
<i>Achilla santolina</i>	40	---	50	---	---	---	40	10	60	---	---	---
<i>Anacyclus alexandrinus</i>	90	---	100	---	---	---	80	20	90	---	---	---
<i>Carduncellus eriocephalus</i>	---	30	50	---	---	---	---	30	50	---	---	---
<i>Centaurea alexandrina</i>	30	30	50	---	---	---	30	30	70	---	---	---
<i>Chrysanthemum coronarium</i>	40	---	70	---	---	---	40	20	80	---	---	---
<i>Scorzonera alexandrina</i>	20	---	20	---	---	---	20	---	20	---	---	---
<i>Silybum marianum</i>	---	10	30	---	---	---	---	20	40	---	---	---
<i>Echium spinosissus</i>	20	---	30	---	---	---	20	---	30	---	---	---
<i>Heliotropium bacciferum</i>	---	10	20	---	---	---	---	10	30	---	---	---
<i>Echium sericeum</i>	---	10	---	---	---	---	---	20	20	---	---	---
<i>Brassica tiarnerfortii</i>	60	---	90	---	---	---	50	---	90	---	---	---
<i>Cardaria draba</i>	30	---	70	---	---	---	30	---	70	---	---	---
<i>Erucaria pinnata</i>	---	---	20	---	---	---	---	---	30	---	---	---
<i>Moricandia nitens</i>	10	---	20	---	---	---	20	---	20	---	---	---
<i>Gymnocarpus decandrum</i>	30	30	20	10	10	10	30	40	20	10	20	10
<i>Herniaria hirsuta</i>	---	10	10	---	---	---	---	10	20	---	---	---
<i>Anabasis articulata</i>	10	10	40	---	---	---	10	20	50	---	---	10
<i>Atriplex halimus</i>	---	30	10	---	30	20	---	30	20	---	30	20
<i>Haloxylon salicornicum</i>	70	50	90	50	40	70	70	70	60	60	50	60
<i>Noaea mucronate</i>	20	30	70	20	30	50	30	30	80	30	30	50
<i>Salsola vermiculata</i>	---	10	30	---	10	10	---	20	20	---	10	10
<i>Lotus arabicus</i>	60	---	70	---	---	---	70	---	90	---	---	---
<i>Trifolium tomentosum</i>	---	---	20	---	---	---	---	---	40	---	---	---
<i>Trigonella stellata</i>	10	---	20	---	---	---	30	---	50	---	---	---
<i>Vicia monantha</i>	---	---	30	---	---	---	---	---	50	---	---	---
<i>Marrubium alysson</i>	---	10	20	---	---	---	---	10	30	---	---	---
<i>Asphodelus microcarpus</i>	70	30	70	---	---	---	70	40	80	---	---	---
<i>Aegilops kotschy</i>	20	10	40	---	---	---	20	20	50	---	---	---
<i>Avena sativa</i>	20	10	50	---	---	---	20	20	60	---	---	---
<i>Cynodon dactylon</i>	20	---	50	20	---	30	30	10	40	20	10	40
<i>Hordeum maritimum</i>	30	30	90	---	---	---	50	20	90	---	---	---
<i>Adonis dentata</i>	20	20	40	---	---	---	20	10	50	---	---	---
<i>Reseda decursiva</i>	---	30	50	---	---	---	---	30	40	---	---	---
<i>Lycium shawii</i>	30	40	20	20	40	10	40	40	20	20	40	20
<i>Thymelaea hirsuta</i>	60	40	50	60	40	50	60	50	50	40	40	50
<i>Pegoanum harmala</i>	10	20	20	---	---	---	20	10	20	---	---	---
Total	860	550	1620	220	250	300	940	690	1830	220	280	320

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دراسات على الغطاء النباتى الطبيعى بوادى أم الرخم بالساحل الشمالى الغربى لمصر

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قسم البيئة النباتية والمراعى _ مركز بحوث الصحراء - المطرية - القاهرة

أجريت هذه الدراسة بمنطقة الرعى بوادى أم الرخم بالساحل الشمالى الغربى لمصر فى الفترة من ربيع عام 2004 إلى خريف عام 2005 وذلك لحصر وتصنيف ودراسة تأثير المواقع والمواسم (الربيع والخريف) والأعوام على الإنتاجية الغضة والجافة وكذلك بعض الصفات الرعوية (التغطية - التغطية النسبية - التكرار- التكرار النسبى- الكثافة - الكثافة النسبية - الأهمية النسبية للنوع) . وقد أظهرت الدراسة وجود 38 نوع نباتى تنتمى إلى 17 عائلة نباتية، منها 18 نوع نباتى حولى (منها 11 نوع نباتى مستساغ و7 أنواع نباتية غير مستساغة) و20 نوع نباتى معمر (منها 7 أنواع نباتية مستساغة و 13 نوع نباتى غير مستساغ).

أظهرت الدراسة أن منطقة بطن الوادى كانت أعلى قيم فى معظم الصفات تحت الدراسة تلتها منطقة جرف الوادى وكانت أقل القيم فى منطقة سفح الوادى، وتفوقت معظم الصفات فى موسم الربيع مقارنة بموسم الخريف بينما لم تكن هناك فروق معنوية بين عامى الدراسة بالنسبة للصفات تحت الدراسة. وقد كان للتفاعل أثر معنوى على معظم الصفات تحت الدراسة.