

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

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El-Morsy, M. H. M. and Ahmed, S. TH.

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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 semishrubs 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

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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-Rakham2004 and 2005.

year		2004				2005				
Month	Average Temperature (°C)		R.H. Rainfed		Averag peratur		R.H.	Rainfed mm.		
	Max.	Min.	Mean	%	mm.	Max.	Min.	Mean	%	
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	1 6.17	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	<mark>19.4</mark> 7	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).

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

 Table (2): Soil physical analysis of experimental location in Wadi

 Umm El-Rakham

 Table (3): Soil chemical analysis of experimental location in Wadi

 Umm El-Rakham

				Ani	ons		Cati	ons	
Location	Depth (cm)	"II		(mg	/ L)		(mg / L)		
Location		рН	CaCo ₃ %	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/ m^2
- 2. Dry foliage (forage) yield (Fresh and dry foliage in g/m^2 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 Ludwing & 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-Rakhamvegetation during the period of spring 2004 and fall 2005 seasons.

Family name	Scientific name	Vernacular name	Palatability	Life duration
Apiaceae	Deverra tortuosa	Qozzaah	Up	Pr
Araceeae	Arisarum vulgare	Reinish	P	Pr
	Achilla santolina	Beeithraan	Up	Ann
	Anacyclus alexandrinus	Sorret El-Kabsh	P	Ann
	Carduncellus erioceplalus	Kharshoof	up	pr
	Centaurea alexandrina	Moraar	up	pr
Asteraceae	Chrysanthemum	Oqhowaan	Up	Ann
	Scorzonera alexandrina	Dabbaah	Up	Pr
	Silybum marianum	Shoak El-	Up	Pr
	Echinons spinosissus		Un	Ann
		Qadaad	Op	Aun
Boraginaceae	bacciferum	Libbeid	Up	Pr
	Echium sericeum	Saaq El-Hamam	Р	Pr
	Brassica tiurnefortii	Shilltaam	P	Ann
Draccioncono	Cardaria draba	Lislis	P	Pr
Drassicaceae	Erucaria pinnata	Seleikh	Р	Ann
	Moricandia nitens	Rakham	Р	Ann
Caryophullacea	Gymnocarpos decandrum	Garad	Р	Pr
e	Herniaria hirsuta	Omm lebbeid	Up	Ann
Chenopodiacea	Anabsis articulata	Agram	Up	Pr
÷	Atriplex halimus	Qataaf	Р	Pr
	Halocxylon			
	salicornicum	Rimth	Up	Pr
Boraginaceae	Noaea mucronate	ShoakEl-	Up	Pr
	Salsola vermiculata		Un	Pr
			•	Ann
				Ann
Fabaceae			-	Ann
	-			Ann
Lamiaceae			-	Ann
				Pr
Linucene				Ann
	.			Ann
Poaceae			P	Pr
		•	-	Ann
Ranunculaceae			-	Ann
		-		Ann
		-		Pr
		<u> </u>		Pr
Zygophyllaceae	Pegoanum harmala	Harmal	Up	Pr
	Apiaceae Araceeae Araceeae Asteraceae Boraginaceae Brassicaceae Caryophullacea e Chenopodiacea e Boraginaceae Chenopodiacea e Chenopodiaceae e Chenopodiaceae e Boraginaceae Boraginaceae Chenopodiaceae Boraginaceae	ApiaceaeDeverra tortuosaAraceeaeArisarum vulgare Achilla santolinaAracyclus alexandrinus Carduncellus erioceplalusCarduncellus erioceplalusAsteraceaeCentaurea alexandrina Chrysanthemum coronarium Scorzonera alexandrinaAsteraceaeCentaurea alexandrina Chrysanthemum coronarium Scorzonera alexandrinaBoraginaceaeEchiuops spinosissus Heliotropium bacciferum Echium sericeum Brassica tiurnefortii Cardaria draba Erucaria pinnata Moricandia nitens Gymnocarpos decandrum eCaryophullacea eGymnocarpos decandrum Herniaria hirsutaChenopodiacea eAtriplex halimus Halocxylon salicornicumBoraginaceaeSalsola vermiculata Lotus arabicus Trifolium tomentosum Trigonella stellata Vicia monanthaLamiaceae LiliaceaeMarrubium alysson Asphodelus microcarpus Aegilops kotschyi Avena sativa Cynodon dactylon Hordeum maritimumRanunculaceae SolanceaeReseda decursiva Lycium shawii Thymelaceae	Family nameScientific namenameApiaceaeDeverra tortuosaQozzaahAraceeaeArisarum vulgareReinishAnacyclus alexandrinusSorret El-KabshCarduncelluserioceplalusCarduncellusKharshooferioceplalusCentaurea alexandrinaChrysanthemumOqhowaancoronariumDabbaahSilybum marianumShoak El-Silybum marianumGamalBoraginaceaeBecithraanBrassicaceaeEchiuops spinosisusQadaadHeliotropiumBrassicaceaeCardaria drabaLisisSaaq El-HamamBrassicaceaeGymnocarposGaradGaradeGymnocarposgaradGecandrumeAnabsis articulataAnabsis articulataAgrameAtriplex halimusQataafGataffilolum tomentosumQatafilolum tomentosumQatafilolum tomentosumGataffilolum tomentosum <td>Family nameScientific namenamePalatability nameApiaceaeDeverra tortuosaQozzaahUpAraceeaeArisarum vulgareReinishPAchilla santolinaBecithraanUpAnacyclus alexandrinusSorret El-KabshPCarduncellusKharshoofuperiocepialusKharshoofupCentaurea alexandrinaMoraarupChrysanthemumOqhowaanUpsteraceaeCentaurea alexandrinaDabbaahUpSorzonera alexandrinaDabbaahUpBoraginaceaebacciferumSaaq El-HamamBoraginaceaebacciferumSaaq El-HamamBrassicaceaeCardaria drabaLislisPCardaria drabaLislisPMoricandia nitensRakhamPMoricandia nitensRakhamPMoricandia nitensRakhameHeniaria hirsutaOmm lebbeidUpSalolo vermiculataAgramupLotus arabicusGatadpTrifoellum tomentosumQataafpTrifoellum tomentosumQattpTrifoellum tomentosumQattpAnabsis articulataHanashUpSalsola vermiculataKhreizaCaroyophullaceaGatbUpfHalocxylonRimthUpSalsola vermiculataHanashPoaceaeMartubium alyssonRobiePoaceaeAvena sativaZommerPoaceae<</td>	Family nameScientific namenamePalatability nameApiaceaeDeverra tortuosaQozzaahUpAraceeaeArisarum vulgareReinishPAchilla santolinaBecithraanUpAnacyclus alexandrinusSorret El-KabshPCarduncellusKharshoofuperiocepialusKharshoofupCentaurea alexandrinaMoraarupChrysanthemumOqhowaanUpsteraceaeCentaurea alexandrinaDabbaahUpSorzonera alexandrinaDabbaahUpBoraginaceaebacciferumSaaq El-HamamBoraginaceaebacciferumSaaq El-HamamBrassicaceaeCardaria drabaLislisPCardaria drabaLislisPMoricandia nitensRakhamPMoricandia nitensRakhamPMoricandia nitensRakhameHeniaria hirsutaOmm lebbeidUpSalolo vermiculataAgramupLotus arabicusGatadpTrifoellum tomentosumQataafpTrifoellum tomentosumQattpTrifoellum tomentosumQattpAnabsis articulataHanashUpSalsola vermiculataKhreizaCaroyophullaceaGatbUpfHalocxylonRimthUpSalsola vermiculataHanashPoaceaeMartubium alyssonRobiePoaceaeAvena sativaZommerPoaceae<

P = Palatable

Up = Unpalatable

Ann =

Annual

Perennial

Pr =

two for each of Boraginaceae, Caryophllaceae and Chenopodiceae. 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) vield:

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 vield 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.

Year	Saacan		Location	Season	Voormoon	
	Season	Тор	Ridge	Bed	mean	Year mean
2004	Spring	67.17	89.78	127.71	94.89	
2004	Fall	4.42	6.46	6.62	5.83	50.36
Locatio	n x Season	35.80	48.12	67.17	50.36	
2005	Spring	77.38	99.65	135.26	104.10	
2005	Fall	3.63	6.15	9.50	6.43	55.26
Locatio	n x Season	40.51	52.90	72.38	55.26	
LSD. $_{0.05}$ Years = 8.16 LSD. $_{0.05}$ Years X					asons = 11.5	53

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.

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

LSD.005 Years X seasons x location =19.97

Saaraa		location		Maan	
Season	Тор	Ridge	Bed	Mean	
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		ason X location 9.97	

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

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 Halocxylon 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.

Veer	Saaraa		Location	1	Season	Vaar
Year	Season	Тор	Ridge	Bed	mean	Year mean
2004	Spring	18.98	27.08	35.45	27.17	
2004	Fall	2.06	2.94	3.00	2.67	14.92
Locations	x Season	10.52	15.01	19.23	14.92	
2005	Spring	22.53	30.58	36.30	29.80	
2005	Fall	1.70	2.75	3.51	2.65	16.23
Locations x Season		12.12	16.67	19.91	16.23	
LSD. $_{0.05}$ Years = 2.20			LSD. 0	05 Years X s	seasons $= 3.1$	2

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

LSD.0.05 Years X seasons x location =5.40

Table (6b): Dry forage yield (g/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.

Faaran		Location		Maan
Season	Тор	Ridge	Bed	Mean
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	6		Location	1	Season	Year
	Season	Тор	Ridge	Bed	mean	mean
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	
2005	Fall	1.28	1.33	1.78	1.46	7.34
Locations	x Season Mean	7.16	3.71	11.17	7.34	
LS	SD. $_{0.05}$ Years = 1.	7	LS	SD. 0.05 Yea	rs X seasons =	= 2.40
LSD. $_{0.05}$ Years x location = 2.94			LSD.0.0	5 Years X s	easons x loca	tion = 4.1

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.

Seegen		Maan		
Season —	Тор	Ridge	Bed	Mean
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		LSD. 0.05 location	LSD. 0.0	05 seasons X
=1.7		= 2.08	loc	ation = 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 nosignificant 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	Saacon		Locati	on	Season	Year
	Season	Тор	Ridge	Bed	mean	mean
2004	Spring	18.05	29.25	36.83	28.04	
2004	Fall	8.99	12.71	13.26	11.65	19.85
Locatio	Location x Season		20.98	25.05	19.85	
2005	Spring	19.50	31.91	39.63	30.35	
2005	Fall	9.36	13.50	14.77	12.54	21.45
Location x Season		14.43	22.71	27.20	21.45	
LSD. $_{0.05}$ Year = 3.54			LSD. 0.0	5 Year X sea	son = 5.00	
					. .	

LSD. $_{0.05}$ Year x Location = 6.13 LSD. $_{0.05}$ 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.

Seegen -		Location		Maan
Season -	Тор	Ridge	Bed	Mean
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. $_{0.05}$ season =3.54 LSD. $_{0.05}$ Location = 4.33 LSD. $_{0.05}$ season X Location = 6.13

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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.

Veer	Saaram		Location	n	Season	Year
Year	Season	Тор	Ridge	Bed	mean	mean
2004	Spring	34.40	23.91	43.78	34.03	
2004	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	
2005	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 Yea	ar = 0.39		LSD. 0.05	Year X sea	son = 3.84	

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

Table (9b): Plant density percentage (plant $/ m^2$) as affected by season, location and interaction between season and location in Wadi Umm El-Rakham from spring 2004 and fall 2005 season.

Sacron		Location		Maan
Season	Тор	Ridge	Bed	Mean
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 = 2.55 LSD_{.0.05} Location = 4.08 LSD_{.0.05} season X Location = 6.45

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

Plant species of Anacyclus alexandrinus, Hordeum maritimum, Brassica tiurnefortii and Halocxylon salicornicum had the highestpercentage and most of these plants were annuals (Table 4 & 15a). On the contrary, the lowest frequency was recorded in Herniaria hirsute and Anabsis articulate. 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 Halocxylon 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 CaCO₃ 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, CaCO₃ and soil fertility.

Table (10): The Importance value of plant species as affected by year, location and season in Wadi Umm El-Rakham during the period at spring 2004 and fall 2005seasons.

Scientific name Spring 2004 Fall 2004 Spring 2005 Top Rid Bed Top Rid String 2005 String 2005	Rid 53.05 0.00 0.00	Bed 49.54 0.00
<i>tortuosa</i> 14.14 24.84 11.41 51.17 <u>57.74</u> 42.52 10.01 20.99 11.42 59.02 Arisarum 0.00 0.00 3.65 0.00 0.00 0.00 0.00 0.00 3.59 0.00	0.00	
		0.00
	0.00	
Achilla 979 000 639 000 000 000 809 203 685 000		0.00
santolina 20.38 0.00 12.30 0.00 0.00 0.00 16.87 4.07 11.24 0.00	0.00	0.00
Carduncellus 0.00 17.63 12.88 0.00 0.00 0.00 0.00 16.66 12.24 0.00	0.00	0.00
alexandrina 8.58 10.54 0.50 0.00 0.00 0.00 0.05 0.85 7.28 0.00	0.00	0.00
<i>coronarium</i> 10.07 0.00 9.18 0.00 0.00 9.02 5.55 9.00 0.00	0.00	0.00
<i>Scorzonera</i> 25.05 0.00 14.23 0.00 0.00 0.00 27.56 0.00 12.15 0.00	0.00	0.00
<i>Silybum</i> 0.00 15.88 17.20 0.00 0.00 0.00 0.00 17.85 16.26 0.00	0.00	0.00
<i>Echiuops</i> <i>spinosissus</i> 5.69 0.00 4.27 0.00 0.00 0.00 5.63 0.00 4.05 0.00	0.00	0.00
Heliotopium 0.00 7.37 5.44 0.00 0.00 0.00 0.00 7.06 6.06 0.00 bacciferum	0.00	0.00
<i>Echium</i> 0.00 8.60 0.00 0.00 0.00 0.00 7.11 2.20 0.00	0.00	0.00
Brassica 14.06 0.00 11.14 0.00 0.00 0.00 12.00 0.00 10.25 0.00	0.00	0.00
<i>tiurnefortii</i> 14.50 0.00 11.14 0.00 0.00 0.00 12.50 0.00 10.55 0.00 <i>Cardaria draba</i> 9.48 0.00 11.39 0.00 0.00 0.00 9.64 0.00 10.82 0.00	0.00	0.00
<i>Erucaria</i> <i>pinnata</i> 0.00 0.00 2.63 0.00 0.00 0.00 0.00 0.00 3.06 0.00	0.00	0.00
Moricandia 3.77 0.00 3.80 0.00 0.00 0.00 5.71 0.00 3.55 0.00	0.00	0.00
<i>Gymnocarpos</i> 0.76 12.16 6.22 13.71 13.52 7.08 10.86 12.87 7.36 13.07	17.78	7.78
<i>uecanarum</i> <i>Herniaria</i> 0.00 7.02 4.20 0.00 0.00 0.00 0.00 7.08 5.16 0.00	0.00	0.00
hirsuta 0.00 7.03 4.30 0.00 0.00 0.00 0.00 7.03 5.10 0.00 Anabsis 4.16 7.46 5.14 0.00 0.00 0.00 4.21 7.69 5.30 0.00	0.00	6.44
articulata Attiintas		
halimus 0.00 17.40 10.81 0.00 34.17 20.09 0.00 10.00 11.20 0.00	31.83	23.86
salicorňicum 25.50 22.11 15.95 05.78 44.09 55.51 24.18 24.90 15.85 50.09	48.81	45.14
Noaea 10.76 13.71 9.84 31.31 31.37 48.13 11.08 16.20 10.58 35.26	26.69	44.74
Salsola 0.00 5.64 3.38 0.00 5.44 4.61 0.00 6.74 2.39 0.00	5.06	9.78
<i>Lotus arabicus</i> 15.15 0.00 10.20 0.00 0.00 0.00 15.76 0.00 11.19 0.00 <i>Trifolium</i> 0.00 0.00 2.20 0.00 0.00 0.00 0.00 0.0	0.00	0.00
tomentosum 0.00 0.00 5.50 0.00 0.00 0.00 0.00 4.00 0.00	0.00	0.00
<i>Trigonella</i> 2.26 0.00 3.14 0.00 0.00 4.16 0.00 4.54 0.00 stellata	0.00	0.00
Vicia monantha 0.00 0.00 5.16 0.00 0.00 0.00 0.00 6.02 0.00 Marrubium 0.00 21.13 9.30 0.00 0.00 0.00 20.30 9.55 0.00	0.00 0.00	0.00 0.00
alysson 0.00 21.15 9.50 0.00 0.00 0.00 20.50 9.55 0.00		
<i>microcarpus</i> 25.44 15.11 15.56 0.00 0.00 0.00 21.58 16.52 14.12 0.00	0.00	0.00
kolschyi 0.29 0.10 0.50 0.00 0.00 7.90 4.44 0.07 0.00	0.00	0.00
Avena sativa 4.65 3.89 9.43 0.00 0.00 0.00 4.28 4.93 9.01 0.00 Cynodon 4.66 0.00 5.11 14.03 0.00 39.00 5.52 1.93 4.01 14.74	$0.00 \\ 4.47$	0.00 15.78
<i>maritimum</i> 5.52 0.51 7.20 0.00 0.00 7.57 5.08 0.47 0.00	0.00	0.00
Reseda 0.00 6.12 3.54 0.00 0.00 0.00 5.15 2.78 0.00	0.00 0.00	$0.00 \\ 0.00$
aecursiva	50.72	34.93
<i>Lycium shawii</i> 27.08 27.41 7.20 50.21 60.19 24.26 26.92 24.92 9.25 50.75 <i>Thymelaea</i> 27.52 28.44 17.02 75.79 52.88 53.69 27.14 28.40 16.67 70.18 <i>hirsuta</i>	61.58	62.02
Pegoanum 4.72 6.38 3.97 0.00 0.00 6.41 5.01 3.75 0.00	0.00	0.00
harmala 1.12 0.30 3.97 0.00 0.00 0.00 0.11 3.01 3.01 5.75 0.00 Total 300	300	300

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.

Log Ku Bed Log Log <thlog< th=""> <thlog< th=""> <thlog< th=""></thlog<></thlog<></thlog<>	Scientific name		Spring 20			Fall 200			Spring 20	05		Fall 200	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		Тор	Rid	Bed	Тор	Rid	Bed	Тор	Rid	Bed	Top	Rid	Bed
$ \begin{array}{cccc} yalagare & 1. & 1. & 3.51 & 1. & 1. & 1. & 1. & 3.53 & 1. & 1. & 1. & 3.53 & 1. & 1. & 1. & 3.53 & 1. & 1. & 1. & 1. & 3.53 & 1. & 1. & 1. & 1. & 1. & 3.53 & 1. & 1. & 1. & 1. & 1. & 1. & 3.53 & 1. & 1. & 1. & 1. & 1. & 1. & 1. & 3.53 & 1. & 1. & 1. & 1. & 1. & 1. & 1. & 1$	tortuosa	4.82	5.19	7.61	0.86	1.00	1.89	5.22	6.19	6.00	0.71	0.78	1.35
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Arisarum			3.51						3.25			
alexindrinus 5.01	Achilla santolina	1.80		2.00				1.48	0.99	2.84			
$\begin{array}{c} eroccepitalis & 1.0 & 1.4 & 1.0 & 1.4 & 1.0 & 0.03 & 1.14 & 1.0 &$	Anacyclus alexandrinµs	3.61		4.18				3.94	0.87	5.18			
$\begin{array}{c} Chrysnithennum \\ corronarium \\ Scorzonera \\ alexandrina \\ 1.25 \\ \dots 1.42 \\ \dots $	erioceplalus		1.09	2.42					0.95	2.14			
$\begin{array}{c} Chrysnithennum \\ corronarium \\ Scorzonera \\ alexandrina \\ 1.25 \\ \dots 1.42 \\ \dots $	alexandrina	4.49	3.59	4.35				4.62	3.21	3.00			
alexyndrina 112	Chrysanthemum	1.26		1.65				1.18	0.62	1.32			
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Scorzonera alexandrina	1.25		1.42				1.79		1.65			
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	marianum		5.87	9.24					7.26	9.54			
$ \begin{array}{ccccc} blaccepteriam & labor 2.00 & labor l$	Echiuops spinosissus	4.68		5.02				4.43		5.64			
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	bacciferum		3.29	3.80					4.09	3.19			
$\begin{array}{c} i \mu rne[ortii] & 0.50 & \dots & 1.38 & \dots & \dots & 1.40 & \dots & 2.29 & \dots & \dots & \dots & \dots \\ Eracaria a charbox a 2.45 & \dots & 2.00 & \dots & \dots & \dots & 1.69 & \dots & 1.78 & \dots & \dots & \dots \\ Eracaria a charbox a 2.45 & \dots & 1.57 & \dots & \dots & \dots & \dots & \dots & 2.22 & \dots & \dots & \dots \\ \mu nreta charbox a charbox a charbox a 1.57 & \dots & \dots & \dots & \dots & \dots & 2.22 & \dots & \dots & \dots \\ \mu rneta charbox a 1.57 & \dots & \dots & \dots & \dots & \dots & \dots & 2.22 & \dots & \dots & \dots \\ \mu rneta charbox a 1.57 & \dots \\ \mu rneta charbox a 1.57 & \dots & $	Echium sericeum		2.78						2.18	1.46			
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		0.96		1.38				1.46		2.29			
primitation	Cardária draba	2.45		2.00				1.69		1.78			
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Erucaria pinnata			1.57						2.22			
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		2.17		4.18				3.30		3.87			
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	decandrum	3.06	4.81	4.36	0.10	0.28	0.16	4.46	4.90	3.69	0.09	0.25	0.15
articulata 0.11 5.00 0.03 1 1 5.00 4.15 0.53 1 1 5.10 Atriplex 9.58 7.01 1.72 1.45 11.90 10.47 1.86 1.81 Hallocxylon 3.89 8.92 5.19 1.52 1.58 1.11 5.59 7.06 4.49 1.10 1.39 1.23 Noaea 4.49 5.18 4.15 0.57 0.44 0.41 4.91 6.30 4.22 0.62 0.47 0.46 Salsola 3.39 3.07 0.07 0.04 0.35 0.58 Triponella 0.49 0.37 0.61 0.43 Triponella 0.49 0.24 0.61 0.43 Triponella 0.49 1.16 0.61 <t< td=""><td>hirsuta</td><td></td><td>0.84</td><td>1.28</td><td></td><td></td><td></td><td></td><td>0.90</td><td>1.75</td><td></td><td></td><td></td></t<>	hirsuta		0.84	1.28					0.90	1.75			
halimus1.111.121.131.111.131.141.131.14Halocxylon salicornicum3.898.925.191.521.581.115.597.064.491.101.391.23Noaea mucronate4.495.184.150.570.440.414.916.304.220.620.470.46Salsola vermiculata tomentosum3.393.070.070.042.482.520.050.04Lotus arabicus0.33 tomentosum0.590.58Trijolium tomentosum0.37 tomentosum0.61 tomentosum0.43Trigonella alsson0.49 tosison0.24 tosison0.61 tosison0.43 tosisonMarubium alsson1.16 tosison0.61 tosison0.85 tosisonMarubium alsson1.16 	articulata	6.11	3.90	6.63				5.00	4.19	6.93			3.10
Salteornicum 6.02 6.02 6.02 6.03 6.02 6.03 6.02 0.64 0.04 0.05 0.04 Lotts arabicus 0.33 0.59 0.01 0.35 1.05 1.04 1.05 1.05 1.04 1.05 1.04 1.05 1.04 1.05 1.05 1.04 1.05 1.04 1.05 1.04 1.05 1.04 1.05 1.04 1.05 1.04 1.05 1.05 1.05 1.04 1.05 1.05 1.05 1.05 1.05 1.04 1.05 </td <td>halimus</td> <td></td> <td>9.58</td> <td>7.01</td> <td></td> <td>1.72</td> <td>1.45</td> <td></td> <td>11.90</td> <td>10.47</td> <td></td> <td>1.86</td> <td>1.81</td>	halimus		9.58	7.01		1.72	1.45		11.90	10.47		1.86	1.81
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	salicornicum	3.89	8.92	5.19	1.52	1.58	1.11	5.59	7.06	4.49	1.10	1.39	1.23
vermiculata 1 5.59 5.07 1 0.07 0.04 1 2.48 2.32 1 0.05 0.04 Lotus arabicus 0.33 0.59 0.21 0.35 1 0.35 1 0.35 1 0.35 0.35 0.58 0.61 0.43	mucronate	4.49	5.18	4.15	0.57	0.44	0.41	4.91	6.30	4.22	0.62	0.47	0.46
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	vermiculata		3.39			0.07	0.04		2.48			0.05	0.04
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Lotus arabicus Trifolium	0.33						0.21					
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	tomentosum			0.37						0.58			
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	stellata	0.49						0.61					
alysson 5.00 4.22 0.02 4.86 Asphodelus microcarpus 5.18 4.41 4.73 7.06 3.83 6.22	Vicia monantha Marrubium												
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	alysson												
kořscíhý 0.42 0.27 0.30 1.12 1.12 0.22 0.30 0.33 1.12 1.12 Avena sativa 0.53 0.88 1.46 $$ $$ 0.72 0.82 1.62 $$ $$ $$ 0.72 0.82 1.62 $$ $$ $$ 0.72 0.82 1.62 $$ $$ $$ 0.72 0.82 1.62 $$ $$ $$ 0.72 0.82 1.62 $$ $$ $$ 0.72 0.82 1.62 $$ $$ $$ 0.72 0.82 1.62 $$ $$ $$ 0.72 0.82 1.62 $$ $$ $$ 0.72 0.82 1.62 $$ $$ $$ 1.60 0.77 $$ $$ 1.33 0.41 0.63 $$ $$ $$ $$ $$ $$ $$ $$ $$ $$ $$ $$ $$ $$ $$ $$ $$	microcarpus												
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	kotschyi												
$\begin{array}{cccccccccccccccccccccccccccccccccccc$													
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	dactylon	0.0003235		0000235553	0.04		0.03				0.02	0.05	0.12
decursiva 1.00 2.17 1.00 2.17 1.00 2.10 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.01 1.00 1.01 1.00 1.01	maritimum												
decursiva 1.00 2.17 1.00 2.17 1.00 2.10 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.01 1.00 1.01 1.00 1.01	Adonis dentata Reseda												
Thymelaea 4.24 3.82 9.24 1.09 1.09 1.13 5.20 4.72 8.44 0.83 0.91 0.97 Pergoanum 4.68 3.68 9.68 6.36 4.22 10.21	decursiva												
Pegoanum 4.68 3.68 9.68 6.36 4.22 10.21	Thymelaea												
narmala	Pegoanum												
10tal 0/.1/ 89.78 127.71 4.42 0.46 0.50 77.38 99.65 135.26 3.63 6.15 9.50	harmala 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 2	004		Fall 2004	£		Spring	2005		Fall 2	005	
Scientific name	Тор	Rid	Bed	Тор	Rid	Bed	Тор	Rid	Bed	Тор	Rid	Bed
Deverra tortuosa	2.09	2.20	3.28	0.51	0.62	1.22	2.41	2.97	2.94	0.42	0.45	0.70
Arisarum vulgare			0.63						0.59			
Achilla santolina	0.28		0.30				0.22	0.15	0.40			
Anacyclus alexandrinus	0.90		0.01				0.91	0.19	1.00			
Carduncellus												
erioceplalus		0.21	0.47					0.17	0.42			
Centaurea alexandrina	1.54	1.14	1.50				1.46	0.98	0.91			
Chrysanthemum	0.22		0.28									
coronarium	0.22		0.28				0.21	0.11	0.22			
Scorzonera alexandrina	0.18		0.18				0.22		0.19			
Silybum marianum		2.05	3.10					2.54	3.15			
Echiuops spinosissus	1.67		1.73				1.57		1.94			
Heliotropium												
bacciferum		0.92	1.02					1.04	0.80			
Echium sericeum		1.14						0.85	0.59			
Brassica tiurnefortii	0.17		0.23				0.25		0.37			
Cardaria draba	0.39		0.35				0.30		0.29			
Erucaria pinnata			0.61						0.85			
Moricandia nitens	0.50		0.98				0.82		0.92			
Gymnocarpos												
decandrum	1.25	1.94	1.70	0.06	0.18	0.07	2.01	2.16	1.54	0.05	0.15	0.09
Herniaria hirsuta		0.15	0.23					0.18	0.32			
Anabsis articulata	1.28	0.86	1.30				1.02	0.82	1.25			0.68
Atriplex halimus		2.86	2.10		0.71	0.56		3.64	3.04		0.78	0.71
Halocxylon												
salicornicum	1.09	2.56	1.43	0.59	0.60	0.31	1.68	2.12	1.34	0.42	0.55	0.49
Noaca mucronate	1.80	2.00	1.61	0.29	0.23	0.21	1.93	2.51	1.66	0.32	0.24	0.23
Salsola vermiculata		0.71	0.61		0.02	0.04		0.53	0.58		0.01	0.01
Lotus arabicus	0.05		0.07				0.03		0.06			
Trifolium tomentosum			0.05						0.07			
Trigonella stellata	0.07		0.03				0.09		0.05			
Vicia monantha			0.19						0.14			
Marrubium alysson		1.57	1.16					1.72	1.37			
Asphodelus												
microcarpus	1.22	1.03	1.06				1.55	0.86	1.35			
Aegilops kotschyi	0.14	0.10	0.09				0.07	0.13	0.11			
Avena sativa	0.15	0.26	0.39				0.20	0.23	0.40			
Cynodon dactylon	0.30		0.45	0.02		002	0.28	0.06	0.38	0.01	0.02	0.05
Hordeum maritimum	0.29	0.05	0.10				0.33	0.09	0.16			
Adonis dentata	0.07	0.01	0.07				0.18	0.07	0.05			
Reseda decursiva		0.43	0.76					0.59	1.06			
Lycium shawii	0.89	2.96	1.03	0.10	0.11	0.09	1.21	3.42	1.50	0.11	0.15	0.14
Thymelaea hirsuta	1.46	1.18	2.58	0.49	0.47	0.50	1.77	1.61	2.26	0.37	0.40	0.41
Pegoanum harmala	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
	10.90	27.00	54.45	2.00	2.54	5.00	44.00	50.50	50.50	1.70	4.15	0.01

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 2	004		Spring	2005		Fall 2	005	
Scientific name	Тор	Rid	Bed	Тор	Rid	Bed	Тор	Rid	Bed	Тор	Rid	Bed
Deverra tortuosa	0.40	0.46	0.42	0.22	0.31	0.33	0.69	0.43	0.44	0.36	0.34	0.40
Arisarum vulgare			0.32						0.38			
Achilla santolina	0.49		0.52				0.42	0.02	0.60			
Anacyclus alexandrinus	1.02		1.03				1.01	0.06	1.19			
Carduncellus erioceplalus		0.42	0.60					0.52	0.73			
Centaurea alexandrina	0.35	0.21	0.52				0.21	0.09	0.58			
Chrysanthemum coronarium	0.62		0.84				0.64	0.02	1.01			
Scorzonera alexandrina	2.39		2.25				3.25		2.23			
Silybum marianum		0.17	0.27					0.21	0.30			
Echiuops spinosissus	0.26		0.32				0.31		0.34			
Heliotropium bacciferum		0.20	0.46					0.24	0.51			
Echium sericeum		0.32						0.22	0.16			
Brassica tiurnefortii	0.48		0.53				0.52		0.66			
Cardaria draba	0.43		1.03				0.50		1.11			
Erucaria pinnata			0.18						0.22			
Moricandia nitens	0.10		0.21				0.16		0.20			
Gymnocarpos decandrum	0.12	0.15	0.23	0.05	0.08	0.06	0.11	0.19	0.25	0.07	0.11	0.06
Herniaria hirsuta		0.08	0.10					0.11	0.13			
Anabsis articulata	0.20	0.24	0.29				0.21	0.24	0.30			0.03
Atriplex halimus		0.09	0.21		0.07	0.09		0.12	0.23		0.07	0.07
Halocxylon salicornicum	0.42	0.31	0.50	0.23	0.19	0.29	0.47	0.51	0.56	0.15	0.26	0.16
Noaea mucronate	0.30	0.23	0.37	0.12	0.13	0.51	0.36	0.49	0.41	0.14	0.11	0.37
Salsola vermiculata		0.19	0.23		0.01	0.02		0.22	0.21		0.01	0.11
Lotus arabicus	0.88		1.03				1.03		1.17			
Trifolium tomentosum			0.33						0.37			
Trigonella stellata	0.08		0.28				0.06		0.31			
Vicia monantha			0.51						0.54			
Marrubium alysson		0.82	0.85					0.91	0.90			
Asphodelus microcarpus	0.86	0.35	1.05				1.00	0.39	1.05			
Aegilops kotschyi	0.62	0.22	1.02				0.68	0.09	1.04			
Avena sativa	0.18	0.07	1.01				0.22	0.11	1.08			
Cynodon dactylon	0.15		0.21	0.05		0.64	0.17	0.01	0.22	0.06	0.01	0.05
Hordeum maritimum	0.11	0.03	0.18				0.12	0.10	0.21			
Adonis dentata	0.13	0.02	0.11				0.11	0.04	0.14			
Reseda decursiva		0.02	0.05					0.03	0.07			
Lycium shawii	0.21	0.21	0.09	0.20	0.19	0.10	0.28	0.21	0.08	0.19	0.19	0.22
- Thymelaea hirsuta	0.36	0.30	0.4	0.19	0.15	0.19	0.44	0.40	0.51	0.31	0.23	0.31
Pegoanum harmala	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 (13b): Relative density as affected by Location, season and year in Wadi Umm El-Rakham at spring 2004 and fall 2005 seasons.

	S	pring 200	4		Fall 2004		s	pring 200	5		Fall 2005	
Scientific name	Тор	Rid	Bed									
Deverra tortuosa	3.56	8.91	2.25	20.75	27.43	14.80	5.29	7.07	2.14	28.13	25.56	22.47
Arisarum vulgare	0.00	0.00	1.72	0.00	0.00	0.00	0.00	0.00	1.85	0.00	0.00	0.00
Achilla santolina	4.36	0.00	2.79	0.00	0.00	0.00	3.22	0.33	2.92	0.00	0.00	0.00
Anacyclus alexandrinus	9.08	0.00	5.53	0.00	0.00	0.00	7.75	0.99	5.79	0.00	0.00	0.00
Carduncellus erioceplalus	0.00	8.14	3.22	0.00	0.00	0.00	0.00	8.55	3.55	0.00	0.00	0.00
Centaurea alexandrina	3.12	4.07	2.79	0.00	0.00	0.00	1.61	1.48	2.82	0.00	0.00	0.00
Chrysanthemum	5.52	0.00	4.51	0.00	0.00	0.00	4.91	0.33	4.91	0.00	0.00	0.00
coronarium	5.52	0.00	4.51	0.00	0.00	0.00	4.91	0.55	4.91	0.00	0.00	0.00
Scorzonera alexandrina	21.28	0.00	12.07	0.00	0.00	0.00	24.92	0.00	10.85	0.00	0.00	0.00
Silybum marianum	0.00	3.29	1.45	0.00	0.00	0.00	0.00	3.45	1.46	0.00	0.00	0.00
Echiuops spinosissus	2.32	0.00	1.72	0.00	0.00	0.00	2.38	0.00	1.65	0.00	0.00	0.00
Heliotropium bacciferum	0.00	3.88	2.47	0.00	0.00	0.00	0.00	3.95	2.48	0.00	0.00	0.00
Echium sericeum	0.00	6.20	0.00	0.00	0.00	0.00	0.00	3.62	0.78	0.00	0.00	0.00
Brassica tiurnefortii	4.27	0.00	2.84	0.00	0.00	0.00	3.99	0.00	3.21	0.00	0.00	0.00
Cardaria draba	3.83	0.00	5.53	0.00	0.00	0.00	3.83	0.00	5.40	0.00	0.00	0.00
Erucaria pinnata	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00	1.07	0.00	0.00	0.00
Moricandia nitens	0.89	0.00	1.13	0.00	0.00	0.00	1.23	0.00	0.97	0.00	0.00	0.00
Gymnocarpos decandrum	1.07	2.91	1.23	4.72	7.08	2.69	0.84	3.13	1.22	5.47	8.27	3.37
Herniaria hirsuta	0.00	1.55	0.54	0.00	0.00	0.00	0.00	1.81	0.63	0.00	0.00	0.00
Anabsis articulata	1.78	4.65	1.56	0.00	0.00	0.00	1.61	3.95	1.46	0.00	0.00	1.69
Atriplex halimus	0.00	1.74	1.13	0.00	6.19	4.04	0.00	1.97	1.12	0.00	5.26	3.93
Halocxylon salicornicum	3.74	6.01	2.68	21.70	16.81	13.00	3.60	8.39	2.73	11.72	19.55	8.99
Noaea mucronate	2.67	4.46	1.98	11.32	11.50	22.87	2.76	8.06	2.00	10.94	8.27	20.79
Salsola vermiculata	0.00	3.68	1.23	0.00	0.88	0.90	0.00	3.62	1.02	0.00	0.75	6.18
Lotus arabicus	7.84	0.00	5.53	0.00	0.00	0.00	7.90	0.00	5.69	0.00	0.00	0.00
Trifolium tomentosum	0.00	0.00	1.77	0.00	0.00	0.00	0.00	0.00	1.80	0.00	0.00	0.00
Trigonella stellata	0.71	0.00	1.50	0.00	0.00	0.00	0.46	0.00	1.51	0.00	0.00	0.00
Vicia monantha	0.00	0.00	2.74	0.00	0.00	0.00	0.00	0.00	2.63	0.00	0.00	0.00
Marrubium alysson	0.00	15.89	4.56	0.00	0.00	0.00	0.00	14.97	4.38	0.00	0.00	0.00
Asphodelus microcarpus	7.66	6.78	5.63	0.00	0.00	0.00	7.67	6.41	5.11	0.00	0.00	0.00
Aegilops kotschyi	5.52	4.26	5.47	0.00	0.00	0.00	5.21	1.48	5.06	0.00	0.00	0.00
Avena sativa	1.60	1.36	5.42	0.00	0.00	0.00	1.69	1.81	5.26	0.00	0.00	0.00
Cynodon dactylon	1.34	0.00	1.13	4.72	0.00	28.70	1.30	0.16	1.07	4.69	0.75	2.81
Hordeum maritimum	0.98	0.58	0.97	0.00	0.00	0.00	0.92	1.64	1.02	0.00	0.00	0.00
Adonis dentata	1.16	0.39	0.59	0.00	0.00	0.00	0.84	0.66	0.68	0.00	0.00	0.00
Reseda decursiva	0.00	0.39	0.27	0.00	0.00	0.00	0.00	0.49	0.34	0.00	0.00	0.00
Lycium shawii	1.87	4.07	0.48	18.87	16.81	4.48	2.15	3.45	0.39	14.84	14.29	12.36
Thymelaea hirsuta	3.21	5.81	2.15	17.92	13.27	8.52	3.37	6.58	2.48	24.22	17.29	17.42
Pegoanum harmala	0.62	0.97	0.48	0.00	0.00	0.00	0.54	1.64	0.54	0.00	0.00	0.00
Total	100	100	100	100	100	100	100	100	100	100	100	100

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.

~	Spring	2004		Fall 2	004		Spring	2005		Fall 20	005	
Scientific name	Тор	Rid.	Bed	Тор	Rid	Bed	Тор	Rid	Bed	Тор	Rid.	Bed
Deverra tortuosa	1.07	2.00	2.01	1.10	1.31	1.44	1.26	2.13	2.16	1.19	1.30	1.69
Arisarum vulgare			0.03						0.04			
Achilla santolina	0.14		0.19				0.12	0.08	0.26			
Anacyclus alexandrinus	0.15		0.22				0.12	0.06	0.21			
Carduncellus erioceplalus		1.18	2.42					1.20	2.36			
Centaurea alexandrina	0.32	0.24	0.23				0.36	0.32	0.25			
Chrysanthemum	0.09		0.13				0.09	0.04	0.15			
coronarium	0.09		0.15				0.09	0.04	0.15			
Scorzonera alexandrina	0.26		0.34				0.10		0.08			
Silybum marianum		3.15	5.12					3.67	5.00			
Echiuops spinosissus	0.19		0.26				0.22		0.30			
Heliotropium bacciferum		0.49	0.64					0.53	0.77			
Echium sericeum		0.17						0.19	0.13			
Brassica tiurnefortii	0.67		1.01				0.70		0.88			
Cardaria draba	0.39		0.57				0.51		0.63			
Erucaria pinnata			0.16						0.14			
Moricandia nitens	0.31		0.53				0.46		0.59			
Gymnocarpos decandrum	0.94	1.11	1.38	0.40	0.31	0.26	1.33	1.26	2.00	0.37	0.32	0.19
Herniaria hirsuta		1.07	1.16					1.22	1.36			
Anabsis articulata	0.22	0.29	0.41				0.30	0.27	0.44			0.24
Atriplex halimus		3.00	3.34		2.03	2.12		3.30	3.56		2.14	2.02
Halocxylon salicornicum	2.47	2.05	2.84	1.74	1.51	2.25	2.56	2.05	3.10	1.60	1.54	2.57
Noaea mucronate	1.04	1.11	1.30	0.98	1.00	1.14	1.00	1.21	1.67	1.00	1.04	1.23
Salsola vermiculata		0.04	0.11		0.07	0.05		0.07	0.11		0.10	0.07
Lotus arabicus	0.06		0.13				0.08		0.23			
Trifolium tomentosum			0.11						0.03			
Trigonella stellata	0.07		0.15				0.10		0.12			
Vicia monantha			0.21						0.26			
Marrubium alysson		1.00	1.29					1.24	1.40			
Asphodelus microcarpus	1.38	2.01	2.00				1.26	2.14	1.84			
Aegilops kotschyi	0.08	0.03	0.16				0.12	0.02	0.11			
Avena sativa	0.13	0.21	0.34				0.09	0.07	0.19			
Cynodon dactylon	0.18		0.33	0.02		0.04	0.20	0.10	0.30	0.09	0.02	0.07
Hordeum maritimum	0.19	0.14	0.25				0.26	0.17	0.21			
Adonis dentata	0.12	0.17	0.20				0.14	0.21	0.19			
Reseda decursiva		0.08	0.07					0.10	0.10			
Lycium shawii	3.92	4.70	2.02	2.00	3.48	2.18	4.00	5.00	3.08	2.51	2.99	2.41
Thymelaea hirsuta	3.13	4.49	4.34	2.75	3.00	3.78	3.39	4.65	4.54	2.60	4.05	4.28
Pegoanum harmala	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 (14b): Relative Herbage cover of plant species as affected by Location and season in Wadi Umm El-Rakham at spring 2004 and fall 2005 seasons.

0.1.118	S	oring 200	4		Fall 2004		s	pring 20()5		Fall 2005	;
Scientific name	Тор	Rid	Bed									
Deverra tortuosa	5.93	6.84	5.46	12.24	10.31	10.86	6.46	6.68	5.45	12.71	9.63	11.44
Arisarum vulgare	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00
Achilla santolina	0.78	0.00	0.52	0.00	0.00	0.00	0.62	0.25	0.66	0.00	0.00	0.00
Anacyclus alexandrinus	0.83	0.00	0.60	0.00	0.00	0.00	0.62	0.19	0.53	0.00	0.00	0.00
Carduncellus erioceplalus	0.00	4.03	6.57	0.00	0.00	0.00	0.00	3.76	5.96	0.00	0.00	0.00
Centaurea alexandrina	1.77	0.82	0.62	0.00	0.00	0.00	1.85	1.00	0.63	0.00	0.00	0.00
Chrysanthemum coronarium	0.50	0.00	0.35	0.00	0.00	0.00	0.46	0.13	0.38	0.00	0.00	0.00
Scorzonera alexandrina	1.44	0.00	0.92	0.00	0.00	0.00	0.51	0.00	0.20	0.00	0.00	0.00
Silybum marianum	0.00	10.77	13.90	0.00	0.00	0.00	0.00	11.50	12.62	0.00	0.00	0.00
Echiuops spinosissus	1.05	0.00	0.71	0.00	0.00	0.00	1.13	0.00	0.76	0.00	0.00	0.00
Heliotropium bacciferum	0.00	1.68	1.74	0.00	0.00	0.00	0.00	1.66	1.94	0.00	0.00	0.00
Echium sericeum	0.00	0.58	0.00	0.00	0.00	0.00	0.00	0.60	0.33	0.00	0.00	0.00
Brassica tiurnefortii	3.71	0.00	2.74	0.00	0.00	0.00	3.59	0.00	2.22	0.00	0.00	0.00
Cardaria draba	2.16	0.00	1.55	0.00	0.00	0.00	2.62	0.00	1.59	0.00	0.00	0.00
Erucaria pinnata	0.00	0.00	0.43	0.00	0.00	0.00	0.00	0.00	0.35	0.00	0.00	0.00
Moricandia nitens	1.72	0.00	1.44	0.00	0.00	0.00	2.36	0.00	1.49	0.00	0.00	0.00
Gymnocarpos decandrum	5.21	3.79	3.75	4.45	2.44	1.96	6.82	3.95	5.05	3.95	2.37	1.29
Herniaria hirsuta	0.00	3.66	3.15	0.00	0.00	0.00	0.00	3.82	3.43	0.00	0.00	0.00
Anabsis articulata	1.22	0.99	1.11	0.00	0.00	0.00	1.54	0.85	1.11	0.00	0.00	1.62
Atriplex halimus	0.00	10.26	9.07	0.00	15.97	15.99	0.00	10.34	8.98	0.00	15.85	13.68
Halocxylon salicornicum	13.68	7.01	7.71	19.35	11.88	16.97	13.13	6.42	7.82	17.09	11.41	17.40
Noaea mucronate	5.76	3.79	3.53	10.90	7.87	8.60	5.13	3.79	4.21	10.68	7.70	8.33
Salsola vermiculata	0.00	0.14	0.30	0.00	0.55	0.38	0.00	0.22	0.28	0.00	0.74	0.47
Lotus arabicus	0.33	0.00	0.35	0.00	0.00	0.00	0.41	0.00	0.58	0.00	0.00	0.00
Trifolium tomentosum	0.00	0.00	0.30	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00
Trigonella stellata	0.39	0.00	0.41	0.00	0.00	0.00	0.51	0.00	0.30	0.00	0.00	0.00
Vicia monantha	0.00	0.00	0.57	0.00	0.00	0.00	0.00	0.00	0.66	0.00	0.00	0.00
Marrubium alysson	0.00	3.42	3.50	0.00	0.00	0.00	0.00	3.89	3.53	0.00	0.00	0.00
Asphodelus microcarpus	7.65	6.87	5.43	0.00	0.00	0.00	6.46	6.71	4.64	0.00	0.00	0.00
Aegilops kotschyi	0.44	0.10	0.43	0.00	0.00	0.00	0.62	0.06	0.28	0.00	0.00	0.00
Avena sativa	0.72	0.72	0.92	0.00	0.00	0.00	0.46	0.22	0.48	0.00	0.00	0.00
Cynodon dactylon	1.00	0.00	0.90	0.22	0.00	0.30	1.03	0.31	0.76	0.96	0.15	0.47
Hordeum maritimum	1.05	0.48	0.68	0.00	0.00	0.00	1.33	0.53	0.53	0.00	0.00	0.00
Adonis dentata	0.66	0.58	0.54	0.00	0.00	0.00	0.72	0.66	0.48	0.00	0.00	0.00
Reseda decursiva	0.00	0.27	0.19	0.00	0.00	0.00	0.00	0.31	0.25	0.00	0.00	0.00
Lycium shawii	21.72	16.07	5.48	22.25	27.38	16.44	20.51	15.67	7.77	26.82	22.15	16.32
Thymelaea hirsuta	17.34	15.35	11.78	30.59	23.60	28.51	17.38	14.57	11.46	27.78	30.00	28.98
Pegoanum harmala	2.94	1.78	2.25	0.00	0.00	0.00	3.74	1.91	2.12	0.00	0.00	0.00
Total	100	100	100	100	100	100	100	100	100	100	100	100

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 20	04		Spring	g 2005		Fall 20	05	
	Тор	Rid	Bed	Тор	Rid	Bed	Тор	Rid	Bed	Тор	Rid	Bed
Deverra tortuosa	40	50	60	40	50	50	40	50	70	40	50	50
Arisarum vulgare			30						30			
Achilla santolina	40		50				40	10	60			
Anacyclus alexandrinus	90		100				80	20	90			
Carduncellus erioceplalus		30	50					30	50			
Centaurea alexandrina	30	30	50				30	30	70			
Chrysanthemum coronarium	40		70				40	20	80			
Scorzonera alexandrina	20		20				20		20			
Silybum marianum		10	30					20	40			
Echiuops spinosissus	20		30				20		30			
Heliotropium bacciferum		10	20					10	30			
Echium sericeum		10						20	20			
Brassica tiurnefortii	60		90				50		90			
Cardaria draba	30		70				30		70			
Erucaria pinnata			20						30			
Moricandia nitens	10		20				20		20			
Gymnocarpos decandrum	30	30	20	10	10	10	30	40	20	10	20	10
Herniaria hirsuta		10	10					10	20			
Anabsis articulata	10	10	40				10	20	50			10
Atriplex halimus		30	10		30	20		30	20		30	20
Halocxylon salicornicum	70	50	90	50	40	70	70	70	60	60	50	60
Noaea mucronate	20	30	70	20	30	50	30	30	80	30	30	50
Salsola vermiculata		10	30		10	10		20	20		10	10
Lotus arabicus	60		70				70		90			
Trifolium tomentosum			20						40			
Trigonella stellata	10		20				30		50			
Vicia monantha			30						50			
Marrubium alysson		10	20					10	30			
Asphodelus microcarpus	70	30	70				70	40	80			
Aegilops kotschyi	20	10	40				20	20	50			
Avena sativa	20	10	50				20	20	60			
Cynodon dactylon	20		50	20		30	30	10	40	20	10	40
Hordeum maritimum	30	30	90				50	20	90			
Adonis dentata	20	20	40				20	10	50			
Reseda decursiva		30	50					30	40			
Lycium shawii	30	40	20	20	40	10	40	40	20	20	40	20
Thymelaea hirsuta	60	40	50	60	40	50	60	50	50	40	40	50
Pegoanum harmala	10	20	20				20	10	20			
Total	860	550	1620	220	250	300	940	690	1830	220	280	32(

Table (15b): Relative 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	S	pring 200)4		Fall 2004		S	pring 200	5		Fall 2005	
Scientific name	Тор	Rid	Bed	Тор	Rid	Bed	Тор	Rid	Bed	Тор	Rid	Bed
Deverra tortuosa	4.65	9.09	3.70	18.18	20.00	16.67	4.26	7.25	3.83	18.18	17.86	15.63
Arisarum vulgare	0.00	0.00	1.85	0.00	0.00	0.00	0.00	0.00	1.64	0.00	0.00	0.00
Achilla santolina	4.65	0.00	3.09	0.00	0.00	0.00	4.26	1.45	3.28	0.00	0.00	0.00
Anacyclus alexandrinus	10.47	0.00	6.17	0.00	0.00	0.00	8.51	2.90	4.92	0.00	0.00	0.00
Carduncellus erioceplalus	0.00	5.45	3.09	0.00	0.00	0.00	0.00	4.35	2.73	0.00	0.00	0.00
Centaurea alexandrina	3.49	5.45	3.09	0.00	0.00	0.00	3.19	4.35	3.83	0.00	0.00	0.00
Chrysanthemum coronarium	4.65	0.00	4.32	0.00	0.00	0.00	4.26	2.90	4.37	0.00	0.00	0.00
Scorzonera alexandrina	2.33	0.00	1.23	0.00	0.00	0.00	2.13	0.00	1.09	0.00	0.00	0.00
Silybum marianum	0.00	1.82	1.85	0.00	0.00	0.00	0.00	2.90	2.19	0.00	0.00	0.00
Echiuops spinosissus	2.33	0.00	1.85	0.00	0.00	0.00	2.13	0.00	1.64	0.00	0.00	0.00
Heliotropium bacciferum	0.00	1.82	1.23	0.00	0.00	0.00	0.00	1.45	1.64	0.00	0.00	0.00
Echium sericeum	0.00	1.82	0.00	0.00	0.00	0.00	0.00	2.90	1.09	0.00	0.00	0.00
Brassica tiurnefortii	6.98	0.00	5.56	0.00	0.00	0.00	5.32	0.00	4.92	0.00	0.00	0.00
Cardaria draba	3.49	0.00	4.32	0.00	0.00	0.00	3.19	0.00	3.83	0.00	0.00	0.00
Erucaria pinnata	0.00	0.00	1.23	0.00	0.00	0.00	0.00	0.00	1.64	0.00	0.00	0.00
Moricandia nitens	1.16	0.00	1.23	0.00	0.00	0.00	2.13	0.00	1.09	0.00	0.00	0.00
Gymnocarpos decandrum	3.49	5.45	1.23	4.55	4.00	3.33	3.19	5.80	1.09	4.55	7.14	3.13
Herniaria hirsuta	0.00	1.82	0.62	0.00	0.00	0.00	0.00	1.45	1.09	0.00	0.00	0.00
Anabsis articulata	1.16	1.82	2.47	0.00	0.00	0.00	1.06	2.90	2.73	0.00	0.00	3.13
Atriplex halimus	0.00	5.45	0.62	0.00	12.00	6.67	0.00	4.35	1.09	0.00	10.71	6.25
Halocxylon salicornicum	8.14	9.09	5.56	22.73	16.00	23.33	7.45	10.14	3.28	27.27	17.86	18.7
Noaea mucronate	2.33	5.45	4.32	9.09	12.00	16.67	3.19	4.35	4.37	13.64	10.71	15.6
Salsola vermiculata	0.00	1.82	1.85	0.00	4.00	3.33	0.00	2.90	1.09	0.00	3.57	3.13
Lotus arabicus	6.98	0.00	4.32	0.00	0.00	0.00	7.45	0.00	4.92	0.00	0.00	0.00
Trifolium tomentosum	0.00	0.00	1.23	0.00	0.00	0.00	0.00	0.00	2.19	0.00	0.00	0.00
Trigonella stellata	1.16	0.00	1.23	0.00	0.00	0.00	3.19	0.00	2.73	0.00	0.00	0.00
Vicia monantha	0.00	0.00	1.85	0.00	0.00	0.00	0.00	0.00	2.73	0.00	0.00	0.00
Marrubium alysson	0.00	1.82	1.23	0.00	0.00	0.00	0.00	1.45	1.64	0.00	0.00	0.00
Asphodelus microcarpus	8.14	5.45	4.32	0.00	0.00	0.00	7.45	5.80	4.37	0.00	0.00	0.00
Aegilops kotschyi	2.33	1.82	2.47	0.00	0.00	0.00	2.13	2.90	2.73	0.00	0.00	0.00
Avena sativa	2.33	1.82	3.09	0.00	0.00	0.00	2.13	2.90	3.28	0.00	0.00	0.00
Cynodon dactylon	2.33	0.00	3.09	9.09	0.00	10.00	3.19	1.45	2.19	9.09	3.57	12.5
Hordeum maritimum	3.49	5.45	5.56	0.00	0.00	0.00	5.32	2.90	4.92	0.00	0.00	0.00
Adonis dentata	2.33	3.64	2.47	0.00	0.00	0.00	2.13	1.45	2.73	0.00	0.00	0.00
Reseda decursiva	0.00	5.45	3.09	0.00	0.00	0.00	0.00	4.35	2.19	0.00	0.00	0.00
Lycium shawii	3.49	7.27	1.23	9.09	16.00	3.33	4.26	5.80	1.09	9.09	14.29	6.25
Thymelaea hirsuta	6.98	7.27	3.09	27.27	16.00	16.67	6.38	7.25	2.73	18.18	14.29	15.6
Pegoanum harmala	1.16	3.64	1.23	0.00	0.00	0.00	2.13	1.45	1.09	0.00	0.00	0.00
Total	100	100	100	100	100	100	100	100	100	100	100	100

REFERENCES

- Abou Deya, I. B. (1984): Studies on distribution and adaptation of range plants in Sinai. Ph. D. Thesis. Faculty of Agriculture. Cairo Univ.
- Boulos, L. (1995): Check list Flora of Egypt. Vol. one. Al-Hadara Publishing, Cairo, Egypt.
- El-Kady, H. F. and Sadek, L. A. (1992): On the phytosociology of Wadi Um-Ashtan in the Western Desert of Egypt. *Feddes repertorium* (Berlin) 103, 3-4: 269-277.
- El-Morsy, M. H. (2002): Studies on range plants in Wadi Magid and Wadi Mahgen in the North West coast of Egypt. Ph.D. Thesis, Faculty of Agric., Cairo Univ.
- El-Toukhy, S. A., Ahmed, K. M. and Hendawy, S. H. (2002): Productivity and nutritive value of some associations at Wadi El Natron- El Almeen Road in North Western coast. *J. Agric. Sci.* Mansoura Univ. 27, 1: 233-244.
- Fossati, J., Pautou, G., and Peltier, J. P. (1999): Water as resource and disturbance for Wadi vegetation in a hyperarid area (Wadi Sannur, Eastern Desert, Egypt). *Journal of Arid Environments* 43: 63–77.
- Girgis, W. A. and Ahmad, A. M. (1985): An ecological study of Wadis of south west Sinai, Egypt. *Desert Inst. Bull. A. R.E.* 36, 1: 265-308.
- Girgis, W. A. and Desouky, A. A. (1977): Anecological study of the Wadis Marsa Matruh area. *Desert Inst. Bull.* 27, 2: 231-242.
- Gomez, K. A. and Gomez, A. A. (1984): Statistical Procedures for Agriculture Research. A Wiley- Inter Science Publication, John Wiley & Sons, Inc. New York, USA.
- Ludwig, J. A. and Reynolds, J. F. (1988): Statistical Ecology: a primer on methods and computing. New York, John Wiley & Sons. USA. 337 pp.

- Jackson, M. L. (1956): Soil chemical analysis advanced course. Published by the author, Dept. soils, Wisconsin Univ. Madison, USA.
- Maroof, S. S. (1978): Some studies on distribution and adaptation of grasses in northern Iraq. M. Sc. Thesis. Collage. Agric. And Forestry. Mosul Univ. (cf. M. K., Al-Syoof, 1988, M. Sc. Fac. Agric. Univ. Jordan)
- Mashaly, I. A. (2001): Contribution to the Ecology of the Deltaic Mediterranean Coast, Egypt. *Journal of Biological Sciences* 1, 7: 628-635.
- Mashaly, I. A. (2002): Ecological studies on *Zygophyllum aegyptium* in the Deltaic Mediterranean coast of Egypt. *Pakistan Journal of Biological Sciences* 5, 2: 152-160.
- Mueller-Dombois, D. and Ellenberg H. (1974): Aims and methods of vegetation ecology. Pub. John Wiley & Sons, Inc. New York. U.S.A.
- Rogers, J. A. and King, J. (1972): The distribution and abundance of grass land species in hill pasture in relation to soil aeration and base status. *J. Ecol.* 60, 1: 18-20.
- Sanford, W., Abdel-Samad, F. A., Ismail, T. (1990): A contribution to the study of the vegetation of North-Central Saudi Arabia. Proc. 4th Conf. Agron. Cairo. Vol II: 643-654.
- Shahba, M. A. (1994): Studies on range ecosystem of the Libyan desert. M.Sc. Thesis, Institute of African Research and Studies, Cairo Univ.
- Soil Conservation Service. (1984): Soil survey laboratory methods and procedure for collecting soil samples. Soil Survey Investigations, Report No. 1(Revised 1984), U.S. Dept. Agric., Washington, D. C., USA.
- Tackhölm, V. (1974): Student's flora of Egypt. Cairo University Pub.
- Tag El-Din, S. S., Assaeed, A. M. and Al-Seick, A. (1994): Distribution of range plant communities as influenced by edaphic factors in Raudhat Khuraim. *Egypt J. Appl. Sci.* 9, 10: 69-82.

دراسات على الغطاء النباتى الطبيعى بوادى أم الرخم بالساحل الشمالى الغربى لمصر محمد حلمى المتولى المرسى – سعيد ثابت أحمد 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 المواقع والمواسم (الربيع والخريف) والأعوام على الإنتاجية الغضة والجافة وكذلك بعض الصفات الرعوية (التغطية - التغطية النسبية – التكرار - التكرار النسبى- الكثافة – الكثافة الصفات الرعوية (التغطية - التغطية النسبية – التكرار - التكرار النسبى- الكثافة – الكثافة عائلة نباتية، منها 18 نوع نباتى حولى (منها 11 نوع نباتى مستساغ و7 أنواع نباتية غير مستساغة) و20 نوع نباتى معمر (منها 7 أنوع نباتية مستساغة و 13 نوع نباتى غير مستساغة) و20 نوع نباتى معمر (منها 7 أنوع نباتية مستساغة و 13 نوع نباتى معمر (منها 7 أنوع نباتية مستساغة و 13 نوع نباتى معمر (منها 7 أنوع نباتية مستساغة و 13 نوع نباتى معمر (منها 7 أنوع نباتية مستساغة و 13 نوع نباتى معمر (منها 7 أنوع نباتية مستساغة) و20 نوع نباتى معمر (منها 7 أنوع نباتية مستساغة و 13 نوع نباتى معمر (منها 7 أنوع نباتية مستساغة و 14 نوع نباتى معمر (منها 11 نوع نباتية مستساغ و 15 نوع نباتى غير

أظهرت الدراسة أن منطقة بطن الوادى كانت أعلى قيم فى معظم الصفات تحت الدراسة تاتها 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.