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**POTENTIALITIES OF BAGBAG AREA, NORTHWESTERN
 MEDITERRANEAN COAST OF EGYPT, AS A NATURAL RANGE
 BY**

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ABSTRACT

The vegetation in Bagbag area is formed of eight plant community types dominated and co-dominated by: *Asphodelus ramosus*, *Thymelaea hirsuta*, *Deverra tortuosa*, *Stipa capensis*, *Lygeum spartum*, *Plantago albicans*, *Haloxylon scoparium* and *H. scoparium - T. hirsuta*. Seventeen associated palatable species were recorded in these communities as well as eleven perennials and six annuals. *Asphodelus ramosus* community comprises the highest number of palatable species.

Six palatable perennial species distributed in Bagbag area were selected to evaluate their potentiality for the development of this area. These species are: *Gymnocarpus decander*, *Helianthemum lippii*, *Echiochilon fruticosum*, *Deverra tortuosa*, *Periploca angustifolia* and *Lycium shawii*. *Deverra tortuosa* has proven to have the density and importance value (IV) (7.0 and 32.3, respectively) compared with the other palatable studied species, while *P. angustifolia* had the lowest of density and importance value (0.2 and 2.9). The highest percentage of crude protein (CP), TDN and DCP were determined in the grazeable parts of *P. angustifolia* followed by *L. shawii*. Most of the palatable species had low values of IV and density being dwarf due to heavy grazing. Though the pasture condition of the study area is generally high, the vegetation potential is promising. Whereas multiple improvement and development opportunities in this study area are really available.

 Key Words: NW Mediterranean, range plants, vegetation, palatability, nutritive value, *Gymnocarpus decander*, *Helianthemum lippii*, *Echiochilon fruticosum*, *Deverra tortuosa*, *Periploca angustifolia* and *Lycium shawii* range species.

INTRODUCTION

The Mediterranean coastal land of Egypt (the northern coast) extends from Sallum eastward to Rafah for about 970 km. The western section extends from Sallum to Abu Qir for about 550 km. It is a narrow belt of land parallel to the Mediterranean Sea with different widths according to the position of its southern boundary of the Western Desert Plateau. Its average north - south width, from sea landward, is about 20 km (Zahran *et al.*, 1990 & Zahran and Willis, 1992). The floristic elements in this belt is about 50% of the Egyptian flora which is estimated to be about 2094 species

(Boulos, 1995). Xerophytes represent about 90% of the total number of species in the coastal belt (Hassib, 1951).

The natural range plants in Egypt are few of mostly salt and /or drought tolerant species. They vary in fresh biomass production, distribution, degree of palatability and nutritive value according to environment prevailing in the area. They only produce new growth during the rainy season of late autumn, winter and early spring when soil moisture is fairly adequate (Aslan, 1960). The number and density of palatable range plants in this study of the coastal belt is decreasing due to the heavy grazing and the absence of range management plan.

This study aimed to: 1) vegetation analysis of Bagbag area; and 2) to evaluate the potentialities of the promising six species as range plants to be used in sustainable development of this area.

MATERIALS AND METHODS

The study area (Bagbag) occupies the piedmont plain between the coastal plain and the edge of the calcereous plateau, 40 Km west of Sidi Barrani in the Western Mediterranean coastal land of Egypt, (Fig. 1). It is characterized by single rainy season during the period between October and February, with a mean annual of about 171.4mm. The monthly average temperature ranges between 12.9C° in January and 25.6C° in August (Anonymous, 1979).

Sixteen stands had been selected to study the vegetation. The selected stands were more or less homogenous in structure and species composition. Dominance of the species were used to assign stands to plant communities. In each stand a list of species was recorded and five randomly quadrats (10 x 10m) were used in the study according to Muller- Dombois and Ellenberg (1974). Species density was calculated per unit area whereas frequency and plant cover were measured as a percentage of ground surface. Plant cover was determined using the line intercept method. Three line intercept transects (50 m length) were randomly placed within every stand. The importance value (IV) for different species were calculated according to Ludwig & Reynolds (1988). The density of annuals was calculated in 10 quadrat 1m² in each stand during spring. Taxonomic nomenclature followed according to Täckholm (1974), updated by Boulos (1995).

Through seasonal field visits the degree of preference of each species was assessed followed by its palatability. The palatability of these species was also determined by many authors as Aslan (1960); Le Houérou (1980); Duivebbooden (1985); Heneidy (1992); Heneidy & Bidak (1996); Elkhoully & Hendawy (1999) and Heneidy (2002).

The soils of the communities under this study area in the sixteen stands were sampled at depth of (0-20cm) with three replicates. The physical and chemical properties were analysed according to Jackson (1967) and Piper (1974). The soil moisture content was determined in each stand during spring.

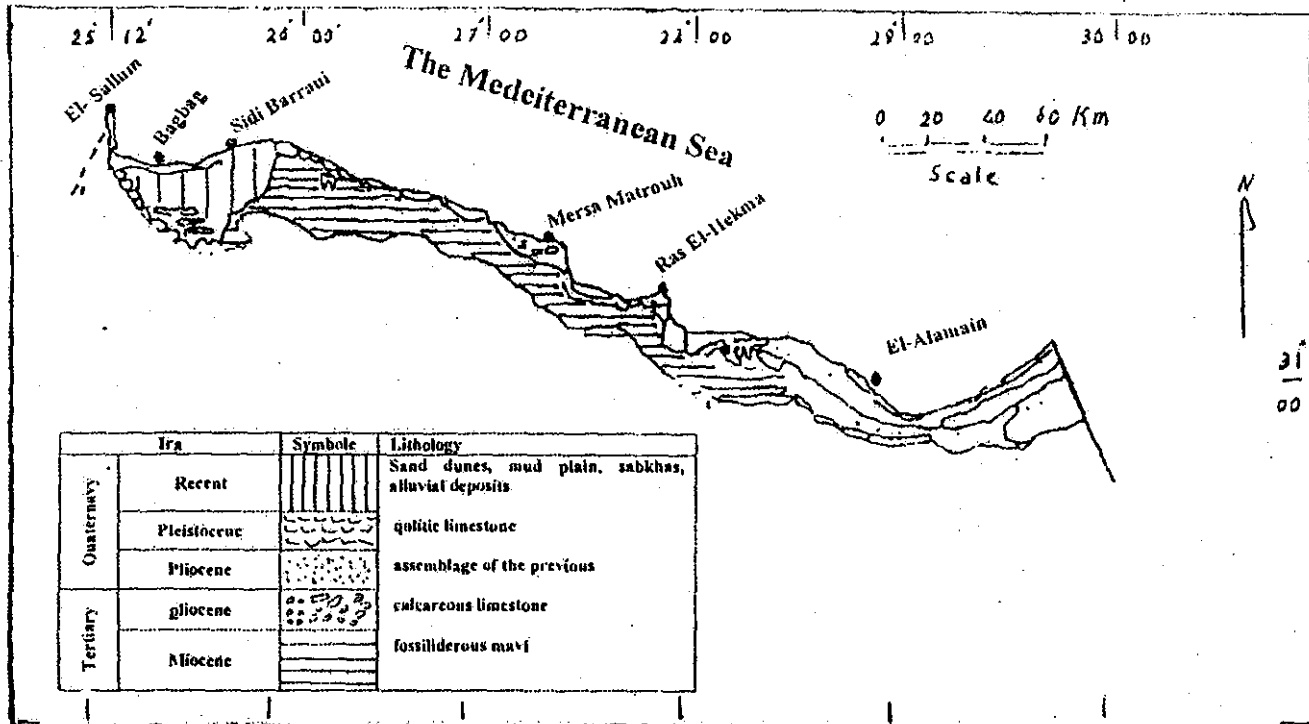


Fig.(1): Geological map of the Northwestern Coast showing Location of the studied area (Bagbag)

After Zahran & Willis 1992

Six range perennial species distributed in these communities were selected to evaluate their potentiality for the development of this study area. These are: *Gemnocarpus decander*, *Helinthemum lippii*, *Echiochilon fruticosum*, *Deverra tortuosus*, *Periploca angustifolia* and *Lycium shawii*. The density and the importance value and presence (P%) of each species were estimated according Mueller-Dombois and ElleMBERG (1974). The height of five individuals of each range species was measured and the growth stage was investigated during spring season.

Samples of brousalable leaves and stems of the studied species were collected from the studied stands during spring. Total carbohydrate (NFE), crude protein (CP), ether extract, ash content, the crude fiber (CF) were determined according to A.O.A.C. (1970). Digestible crude protein (DCP) was estimated according to Le Heuerou (1980) using the formula: $DCP = 0.93 CP - 3.52$. This equation is only valid in the case of nitrogen concentration 3 to 0.61% (or $CP > 3.81\%$) (De Ridder *et al.*, 1982). the TDN was estimated using the equation ($TDN = 65.14 + 0.45 CP - 0.38 CF$) according to Adams *et al.*, (1964). Each plant sample was weighted in the field (fresh weight) and was dried in an oven at 70C° for a constant dry weight. The percentage of water content of plant were calculated.

RESULTS

1. Vegetation of the study area

The vegetation analysis of the sixteen stands indicated that eight plant community types are distributed in Bagbag area. These communities are dominated or co-dominated by: *Asphodelus ramosus*, *Thymelaea hirsuta*, *Deverra tortuosus*, *Stipa capensis*, *Lygeum spartum*, *Plantago albicans*, *Haloxylon scoparium* and *H. scoparium - T. Hirsuta* (Table. 1). In these communities sixty six species were recorded as associates of which 40 are perennials and 26 are annuals. The highest number of associated species (37 species, 23 perennials and 14 annuals) was recorded in each of these communities dominated by *A. ramosus* and *H. scoparium* followed by 36 species (18 perennials and 18 annuals) were recorded in the communities co-dominated by *H. scoparium - T. hirsuta*. *Thymelaea hirsuta* community type had the lowest number of associate species (15 species, 8 perennials and 7 annuals).

Seventeen highly palatable species were recorded in the study area of which are eleven perennials and six are annuals (Table 1). Five of the palatable perennial species were of the lowest importance value (average < 10 %). These species are: *Lotus creticus*, *Kickxia aegyptiaca*, *P. angustifolia*, *L. shawii* and *Atriplex halimus*. Also, three highly palatable annuals were of the lowest density (average < 1/m²). These species were *Medicago polymorpha*, *Hippocrepis cyclocaropa* and *Trigonella stillata*. *Asphodelus ramosus* community type had the highest number of highly palatable species (15 species), followed by 12 species recorded in both of the community types dominated and co-dominated by *H. scoparium* and *H.scoparium-T.hirsuta*, respectively. The lowest value out of the highly palatable 5 species was detected in *T. hirsute* community type.

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Table (1): The vegetation analysis of sixteen stands in Bagbag area (Density of annuals = average No. of individual/m², Highly palatable species in bold).

Species	Density	Cover %	Frequency %	Importance value %
1- <i>Asphodelus ramosus</i> Community type				
* Perennials				
<i>Asphodelus ramosus</i>	106.6	3.8	100	150.1
<i>Haloxylon scoparium</i>	7.2	1.0	85.0	28.6
<i>Gymnocarpus decander</i>	11.0	1.5	80	37.0
<i>Thymelaea hirsuta</i>	6.9	1.4	65	28.5
<i>Deverra tortuosus</i>	4.6	0.4	60.0	16.8
<i>Panocratium tortousa</i>	0.3	0.0	30	5.9
<i>Salvia lanigera</i>	3.3	0.5	65	15.4
<i>Stipa capensis</i>	22.6	0.9	100	44.5
<i>Anabasis articulata</i>	3.4	0.4	100	20.9
<i>Periploca angustifolia</i>	1.6	0.5	40	13.5
<i>Helianthemum lippii</i>	0.4	0.2	20	5.2
<i>Lycium shawii</i>	10.4	0.6	60	20.2
<i>Lotus creticus</i>	0.2	0.2	20	5.1
<i>Farselia aegyptia</i>	0.2	0.0	20	2.8
<i>Centaurea sp</i>	0.2	0.0	20	2.8
<i>Kickxia aegyptiaca</i>	1.0	0.1	60	7.8
<i>Suaeda pruinose</i>	1.6	0.1	60	8.3
<i>Salsola tetrandra</i>	2.6	0.2	80	12.2
<i>Scorzonera undulata</i>	1.4	0.0	20	3.2
<i>Launaea nudicaulis</i>	0.0	0.2	0.0	1.8
<i>Stipagrostis ciliate</i>	8.6	0.3	40.0	14.0
<i>Allium desertorum</i>	0.2	0.1	20.0	3.1
<i>Echiochilon fruticosum</i>	2.8	0.1	40.0	7.3
Total No. of perennials		23		
* Annuals				
<i>Astragalus tribuloides</i>	0.1			
<i>Lasiopogon muscoides</i>	1.0			
<i>Calendula arvensis</i>	0.1			
<i>Plantago ovata</i>	2.1			
<i>Astragalus annularis</i>	0.2			
<i>Launaea capitata</i>	0.1			
<i>Filago desertorum</i>	0.1			
<i>Cutandia memphitica</i>	0.1			
<i>Malva parviflora</i>	0.1			
<i>Hordium murinum sub sp leporinum</i>	0.4			
<i>Trigonella stillata</i>	0.4			
<i>Ifloga spicata</i>	2.4			
<i>Medicago polymorpha</i>	2.4			
<i>Hippocrepis cyclocaroa</i>	0.1			
Total No. of annuals		14		
Total No. of species		37		
Total No. of high palatable species		15		

Table (1): Cont.

Species	Density	Cover %	Frequency %	Importance value %
2- <i>Thymelaea irsute</i> Community type				
* Perennials				
<i>Thymelaea hirsuta</i>	29.4	5.0	100	168.9
<i>Gymnocarpos decander</i>	4.0	0.2	100	29.6
<i>Asphodelus ramosus</i>	2.6	0.5	100	31.5
<i>Echiochilon fruticosum</i>	5.0	0.1	80	26.0
<i>Deverra tortuosus</i>	1.4	0.1	80	18.1
<i>Salvia lanigera</i>	1.6	0.0	60	13.9
<i>Haloxylon scoparium</i>	0.4	0.0	40	7.8
<i>Echinops spinsissmus</i>	0.2	0.0	20	3.8
Total No. of perennials			8	
* Annuals				
<i>Schismus barbatus</i>	25.6			
<i>Filago desertorum</i>	8.1			
<i>Lasiopogon muscoides</i>	5.2			
<i>Centaurea alexandrina</i>	0.6			
<i>Plantago ovata</i>	0.6			
<i>Malva parviflora</i>	1.2			
<i>Ifloga spicata</i>	1.5			
Total No. of annuals			7	
Total No. of species			15	
Total No. of highly palatable species			5	
3- <i>Deverra tortuosus</i> Community type				
* Perennials				
<i>Deverra tortuosus</i>	25.0	2.5	100	128.7
<i>Salvia lanigera</i>	21.6	0.2	100	54.1
<i>Gymnocarpos decander</i>	1.6	0.1	80	18.2
<i>Thymelaea hirsute</i>	1.2	0.2	100	23.0
<i>Lotus creticus</i>	3.2	0.1	60	17.8
<i>Helianthemum lippii</i>	7.0	0.0	80	22.9
<i>Echinops spinsissmus</i>	2.4	0.0	100	18.5
<i>Haloxylon scoparium</i>	0.6	0.1	40	9.9
<i>Citrullus colocynthis</i>	0.2	0.1	20	6.6
Total No. of perennials			9	
Annuals				
<i>Centaurea alexandrina</i>	1.1			
<i>Centaurea glomerata</i>	0.1			
<i>Launaea capitata</i>	0.4			
<i>Diploaxis sp</i>	0.1			
<i>Medicago polymorpha</i>	0.3			
<i>Adonis dentata</i>	0.4			
<i>Plantago cylindrical</i>	0.1			
<i>Anagalis arvensis</i>	0.4			
<i>Hippocrepis cyclocaroa</i>	0.3			
<i>Filago desertorum</i>	12.3			
<i>Ifloga spicata</i>	9.1			
Total No. of annuals			11	
Total No. of species			20	
Total No. of highly palatable species			8	

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Table (1): Cont.

Species	Density	Cover %	Frequency %	Importance value %
4- <i>Stipa capensis</i> Community type				
* Perennials				
<i>Stipa capensis</i>	23.3	0.5	80	75.5
<i>Deverra tortuosus</i>	1.2	0.2	60	18.5
<i>Haloxylon scoparium</i>	1.7	0.4	80	25.1
<i>Thymelaea hirsuta</i>	1.6	1.3	80	40.8
<i>Echinops spinsissmus</i>	2.2	0.1	60	17.2
<i>Gymnocarpus decander</i>	4.3	0.2	100	24.1
<i>Salvia lanigera</i>	1.1	0.1	40	13.3
<i>Lotus creticus</i>	0.7	0.0	30	5.4
<i>Anabasis articulate</i>	1.0	0.2	60	15.7
<i>Pancreatium sickenbergeri</i>	0.6	0.0	40	5.8
<i>Helianthemum lippii</i>	1.1	0.1	60	10.2
<i>Asphodelus ramosus</i>	5.0	0.6	40	25.5
<i>Asparagus stipularis</i>	0.1	0.0	10	1.4
<i>Fagonia Arabica</i>	0.1	0.0	10	1.4
<i>Periploca angustifolia</i>	1.0	0.5	50	16.4
Total No. of perennials	15			
Annuals				
<i>Ifloga spicata</i>	2.4			
<i>Filago desertorum</i>	0.1			
<i>Plantago ovata</i>	1.1			
<i>Schismus barbatus</i>	8.1			
<i>Hardium murinum sub sp leporinum</i>	0.4			
<i>Medicago polymorpha</i>	1.4			
<i>Centaurea alexandrina</i>	0.6			
<i>Lasiopogen muscoides</i>	5.0			
Total No. of annuals	8			
Total No. of species	23			
Total No. of high palatable species	8			
5- <i>Lygeum spartum</i> Community type				
* Perennials				
<i>Lygeum spartum</i>	21.6	2.7	80	43.3
<i>Gymnocarpus decander</i>	10.6	2.2	100	32.8
<i>Deverra tortuosus</i>	6.8	1.5	100	24.3
<i>Haloxylon scoparium</i>	5.0	0.8	100	17.4
<i>Helianthemum lippii</i>	14.0	1.1	100	26.5
<i>Plantago albicans</i>	39.0	0.2	100	37.9
<i>Kickxia aegyptiaca</i>	5.2	0.0	80	9.8
<i>Anabasis articulata</i>	1.0	0.0	60	5.1
<i>Pancreatium arabicum</i>	0.2	0.0	20	1.6
<i>Echiochilon fruticosum</i>	5.8	1.0	80	18.1
<i>Echinops spinsissmus</i>	0.8	0.0	40	3.3
<i>Salsola tetrandra</i>	0.4	0.3	40	5.5
<i>Crucianella maritima</i>	6.2	0.3	80	9.9
<i>Traganum modatum</i>	1.6	0.2	40	5.7

Table (1): Cont.

Species	Density	Cover %	Frequency %	Importance value %
<i>Suaeda vermiculata</i>	3.6	0.8	100	16.4
<i>Asphodelus ramosus</i>	3.6	0.3	60	9.5
<i>Salvia lanigera</i>	3.0	0.2	80	9.7
<i>Thymelaea hirsute</i>	6.2	1.0	80	18.4
<i>Lotus creticus</i>	0.4	0.0	20	1.7
Total No. of perennials			19	
Annual				
<i>Centaurea alexandrina</i>	13.7			
<i>Schismus barbatus</i>	2.6			
<i>Malva poruiflora</i>	0.1			
<i>Filago desertorum</i>	0.8			
<i>Hippocrepis cyclocarpa</i>	1.0			
<i>Lotus glaber</i>	0.3			
<i>Pseudorlaya pumila</i>	0.1			
<i>Carduus getulus</i>	0.3			
<i>Bassia muricata</i>	1.1			
<i>Cutandia memphitica</i>	9.8			
Total No. of annuals			10	
Total No. of species			29	
Total No. of high palatable species			9	
6- <i>Plantago albicans</i> Community type				
* Perennials				
<i>Plantago albicans</i>	97.0	2.0	100	108.2
<i>Crucianella maritime</i>	5.2	1.3	100	27.6
<i>Suaeda vermiculata</i>	4.0	3.2	100	43.9
<i>Gymnocarpus decander</i>	1.4	0.9	80	18.6
<i>Helianthemum kahircum</i>	2.6	0.3	60	11.8
<i>Haloxylon scoparium</i>	0.2	0.9	20	10.7
<i>Salvia lanigera</i>	1.8	0.0	80	10.8
<i>Deverra tortuosus</i>	1.4	0.4	60	11.7
<i>Echiochilon frutescens</i>	4.2	0.7	80	19.1
<i>Fagonia glutinosa</i>	0.2	0.0	20	4.3
<i>Heliotropium digynum</i>	0.4	0.0	40.0	5.1
<i>Echinops spinosissimus</i>	0.2	0.0	20.0	2.5
<i>Lotus creticus</i>	0.2	0.0	20.0	2.5
<i>Thymelaea hirsuta</i>	5.0	1.3	80.0	25.1
Total No. of perennials			14	
Annual				
<i>Centaurea alexandrina</i>	1.7			
<i>Bassia muricata</i>	11.0			
<i>Schismus barbatus</i>	0.4			
<i>Medicago polymorpha</i>	0.1			
<i>Ifloga spicata</i>	1.6			
<i>Filago desertorum</i>	1.0			
<i>Cutandia memphitica</i>	4.5			
Total No. of annuals			7	
Total No. of species			21	
Total No. of high palatable species			9	

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Table (1): Cont.

Species	Density	Cover %	Frequency %	Importance value %
7- <i>Haloxylon scoparium</i> Community type				
* Perennials				
<i>Haloxylon scoparium</i>	39.0	5.1	100	87.6
<i>Thymelaea hirsuta</i>	5.7	1.3	80	25.0
<i>Salvia lanigera</i>	27.5	1.1	100	39.6
<i>Deverra tortuosus</i>	10.8	0.6	100	24.3
<i>Helianthemum lippii</i>	3.8	0.2	70	12.7
<i>Kickxia aegyptiaca</i>	0.4	0.0	30.0	3.7
<i>Lotus creticus</i>	10.8	0.1	60	13.9
<i>Launaea nudicalis</i>	7.8	0.1	60	13.9
<i>Suaeda pruinosa</i>	0.2	0.0	20	2.7
<i>Alkanna tinctoria</i>	0.2	0.0	20	2.7
<i>Marrubium vulgare</i>	1.4	0.0	60	9.5
<i>Heliotropium bacciferum</i>	8.2	0.2	40	12.4
<i>Cistanche phelypaea</i>	0.4	0.0	20	2.8
<i>Asphodelus ramosus</i>	0.4	0.0	40	5.3
<i>Crucianella maritime</i>	17.2	4.5	100	61.2
<i>Gymnocarpos decander</i>	3.0	0.6	60	13.8
<i>Lygeum spartum</i>	11.8	0.9	60	7.6
<i>Salsola tetrandra</i>	0.4	0.1	40	5.3
<i>Echinops spinosissimus</i>	0.0	0.1	0.0	0.7
<i>Atriplex halimus</i>	0.8	0.2	40	6.4
<i>Heliotropium digynum</i>	0.4	0.1	20	3.2
<i>Traganum nudatum</i>	0.8	0.0	40	5.0
<i>Polycarpha repens</i>	0.2	0.0	20	2.3
Total No. of perennials	23			
Annual				
<i>Centaurea alexandrina</i>	7.9			
<i>Centaurea glomerata</i>	0.1			
<i>Launaea capitata</i>	20.4			
<i>Diplotaxis</i> sp	0.1			
<i>Plantago ciliata</i>	0.1			
<i>Medicago polymorpha</i>	0.3			
<i>Adonis dentate</i>	0.4			
<i>Anagalis arvensis</i>	0.4			
<i>Plantago ovata</i>	1.1			
<i>Malva parviflora</i>	0.5			
<i>Astragalus tribuloides</i>	1.6			
<i>Hippocrepis cyclocarpa</i>	0.3			
<i>Filago desertorum</i>	6.5			
<i>Ifloga spicata</i>	4.6			
Total No. of annuals	14			
Total No. of species	37			
Total No. of highly palatable species	12			

Table (1): Cont.

Species	Density	Cover %	Frequency %	Importance value %
8- <i>Haloxylon scoparium</i> - <i>Thymelaea hirsuta</i> Community type				
* Perennials				
<i>Haloxylon scoparium</i>	19.1	1.7	100	54.8
<i>Thymelaea hirsute</i>	13.2	2.1	100	53.2
<i>Asphodelus ramosus</i>	20.4	1.3	80	49.1
<i>Salvia lanigera</i>	12.2	0.6	100	32.4
<i>Lycium Shawii</i>	2.4	0.2	60	11.5
<i>Devera tortuosus</i>	4.5	0.1	100	16.2
<i>Gymnocarpus decander</i>	2.8	0.6	100	21.4
<i>Helianthemum lippii</i>	3.0	0.1	40	8.9
<i>Suaeda pruinosa</i>	2.0	0.2	60	11.0
<i>Salsola tetrandra</i>	1.4	0.1	40	7.0
<i>Kickxia aegyptiaca</i>	0.6	0.0	40	4.8
<i>Echiochilon fruticosum</i>	1.6	0.1	40	7.3
<i>Lotus creticus</i>	0.6	-	20	2.7
<i>Scorzonaria alexandrina</i>	0.2	0.0	20	2.2
<i>Limonium tubiflorum</i>	0.6	0.0	20	2.7
<i>Allium desertorum</i>	0.2	0.1	20	3.5
<i>Tragacanthum nudatum</i>	0.4	0.0	20	2.4
<i>Stipagrostis ciliate</i>	0.2	0.2	20	4.8
Total No. of perennials	18			
Annual				
<i>Centaurea alexandrina</i>	1.2			
<i>Hordium maritimum</i> sup sp <i>leporium</i>	0.6			
<i>Trigonella stillata</i>	0.8			
<i>Medicago polymorpha</i>	0.6			
<i>Plantago ovata</i>	1.1			
<i>Calendula arvensis</i>	1.0			
<i>Astragalus tribuloides</i>	0.6			
<i>Filago desertorum</i>	14.6			
<i>Laciopogon muscoides</i>	9.0			
<i>Hippocrepis cyclocarpa</i>	0.6			
<i>Schismus barbatus</i>	34.0			
<i>Malva parviflora</i>	1.8			
<i>Adonis dentate</i>	0.4			
<i>Psycodora pumila</i>	0.4			
<i>Cotula anthemoides</i>	0.6			
<i>Labularia libyca</i>	0.4			
<i>Anagalis arvensis</i>	0.4			
<i>Cutandia memphitica</i>	0.2			
Total No. of annuals	18			
Total No. of species	36			
Total No. of highly palatable species	12			

2. Soil of the study area

The soil supporting *D. tortuosa*, *A. ramosus* and *S. capensis* community types was mainly sandy, while the soils of *L. spartum*, *H. scoparium*, *P. albicans*, *T. hirsuta* and *H. scoparium-T. hirsuta* community types was sandy loams (Table 2).

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Table (2): Physical and chemical properties for the soils of communities dominating in the study area.

Soil Characteristics	Communities							
	<i>A. ramosus</i>	<i>T. hirsuta</i>	<i>D. tortuosa</i>	<i>S. capensis</i>	<i>L. spartum</i>	<i>P. albicans</i>	<i>H. scoparium</i>	<i>H. scoparium-T. hirsuta</i>
Gravel %	3.6	1.0	1.8	10.8	9.6	1.1	1.3	0.9
Sand %	75.5	71.3	87.8	74.2	47.1	61.8	63.1	62.1
Silt %	2.3	4.0	1.6	3.1	4.5	4.7	3.3	3.7
Clay %	18.6	23.7	8.8	11.9	38.8	32.4	32.3	33.3
PH	7.7	7.5	7.6	7.7	8.2	7.5	7.7	8.3
EC mlmohs/cm	0.51	0.26	0.28	0.31	0.41	0.31	0.54	0.48
Organic matter %	1.3	2.1	1.8	2.0	1.0	1.4	0.6	1.3
Ca CO ₃ %	13.9	8.3	11.1	36.3	18.7	13.2	31.1	31.5
Na ⁺ (me/l)	2.9	2.0	2.1	2.4	2.8	0.9	2.3	0.9
K ⁺ (me/l)	1.1	1.5	1.2	1.2	0.7	0.4	1.07	1.7
Ca ⁺ (me/l)	2.7	3.0	2.5	3.0	2.0	4.0	2.5	2.0
Mg ⁺ (me/l)	1.7	1.5	1.0	1.8	2.0	1.0	2.5	2.0
Cl ⁻² (me/l)	3.0	2.0	2.0	2.3	3.0	2.0	2.5	2.0
SO ₄ ⁻² (me/l)	10.3	11.3	13.5	13.1	0.5	0.2	2.0	0.6
Soil moisture %	6.7	3.9	5.1	2.9	3.6	2.0	1.8	3.0

The soil reaction of all studied communities was weak alkaline. Soils of *H. scoparium*, *A. ramosus* and *H. scoparium-T. hirsuta* communities was relatively saline (0.54, 0.51 and 0.48 ml mohs/cm, respectively) of a higher level than those of the other communities. This may be due to existence of high contents of cations and anions in the soil. The highest percentage of organic matter was detected in the soil *T. hirsuta* community type (2.1%), while the highest percentage of CaCO₃ (36.3%) was obtained in the soil of *Stipa capensis* community type followed by 31.5 and 31.1% attained in the soil *H. scoparium-T. hirsuta* and *H. scoparium* community types, respectively.

During spring, obtained data indicated that the highest value of soil moisture content was 6.7%, in soil supporting *A. ramosus* community type followed by 5.1% in the soil of *D. tortuosa* community type.

3. Evaluation of the six range species

It is noticed that *Gymnocarpus decander* and *Deverra tortuosa* were present in all community types that were recorded in this study area (P= 100%) followed by *Helianthemum lippii* which present in the seven communities (P= 87.5%), *Periploca angustifolia* and *Lycium shawii* were present only in two community types p= 25.0% (Table 3).

Results indicated that *D. tortuosa* has a high density and importance value of 7.0 and 32.3, respectively more than the other concerned range plants (Table 3). *Gymnocarpus decander* has the second highest values of density and importance of 4.4 and 23.6, respectively. The *Periploca angustifolia* has the lowest values of density and importance value of 0.2 and 2.9, respectively. The respective highest density and importance of *G. decander* was 11.0 and 37.0, for *L. shawii* being 10.3 and 19.5 in *A. ramosus* community type. *Helianthemum lippii* had a high value of density and importance value in *L. spartum* community type which was 14.0 and 26.5, respectively. *Echiochilon fruticosum* has a high value of density and importance value in *T. hirsuta* community type 5.0 and 26.0, respectively. The highest values of density and importance value of *D. tortuosa* were recorded in the community type of *D. tortuosa* which was 25.0 and 128.7, respectively. The highest value of density and importance value of *P. angustifolia* (1.0 and 16.4, respectively) in *S. capensis* community type.

Data in Table (4) shows that the height of *G. decander* was 16.7cm in *P. albicans* community type than in the other studied communities. The highest *H. lippii*, *E. fruticosum* and *D. tortuosa* were 10.0, 12.7 and 23.3cm, respectively in *L. spartum* community type. The *Periploca angustifolia* and *L. shawii* have a highest values of height which was 46.7 and 26.7cm, respectively in *A. ramosus* community type. Results indicated that all the studied range species were in the vegetative or/and flowering stage during spring season.

Nutritive value of the broustable parts of the different concerned species during spring are presented in Table (5). The highest percentage of crude protein (CP) was in the edible parts of *P. angustifolia* (20.3%) followed by 15.8 % was attained in *L. shawii*. *Helianthemum lippii* has the highest value of CF followed by *D. tortuosa* (36.8% & 36.7%, respectively). The *Gymnocarpus decander* had the highest percentage of NFE followed by *E. fruticosum* (42.0% & 41.3% respectively). The highest amount of ether extract (EE) was determined in *L. shawii* (9.2%) followed by that of *E. fruticosum* (8.8%). Mineral (ash) content had a maximum value in the edible parts of *L. shawii* (52.2%). Highest TDN was detected in *P. angustifolia* (63.48%) followed by *L. shawii* (59.98%), while the minimum value was obtained in *D. tortuosus* (53.13%). Highest DCP content was obtained in *P. angustifolia* (15.36) followed by *L. shawii* (11.2%)%, while the lowest content was obtained in *G. decander* (0.11 %).

Data in Table (5) shows that, the highest water content was attained in the edible parts of *P. angustifolia* (56.9%) followed by 51.6 % by *L. shawii*. On the other hand, *D. tortuosa* had the lowest percentage of water content (37.5%).

Table (3): Density (D), The Importance value (I.V) of the six range species in 8- communities of Bagbag area at Presence of six range species growing in the communities of Bagbag area.

Range Species	Communities																Average	P%	
	<i>A. ramosus</i>		<i>T. hirsuta</i>		<i>D. tortuosa</i>		<i>S. capensis</i>		<i>L. spartum</i>		<i>P. albicans</i>		<i>H. scoparium</i>		<i>H. scoparium</i> <i>T. hirsuta</i>				
	D	I.V	D	I.V	D	I.V	D	I.V	D	I.V	D	I.V	D	I.V	D	I.V			
<i>G. decander</i>	11.0	37.0	2.0	29.6	1.6	18.2	4.3	24.1	10.6	32.8	1.4	18.6	1.5	6.9	2.8	21.4	4.4	23.3	100
<i>D. tortuosa</i>	4.6	16.8	1.4	18.1	25.0	128.7	1.2	18.3	6.8	24.3	1.4	11.7	10.8	24.3	4.5	16.2	6.3	31.8	100
<i>H. lippii</i>	0.1	1.3	-	-	7.0	22.9	1.2	10.2	14.0	26.5	2.6	11.8	3.8	12.7	3.0	8.9	4.0	11.8	87.5
<i>E. fruticosum</i>	1.4	3.7	5.0	26.0	-	-	-	-	5.8	18.1	4.2	19.1	1.4	17.8	1.6	7.3	1.9	13.6	75
<i>P. angustifolia</i>	0.8	6.8	-	-	-	-	1.0	16.4	-	-	-	-	-	-	-	-	0.2	2.6	25
<i>L. shawii</i>	10.3	19.5	-	-	-	-	-	-	-	-	-	-	-	-	2.4	11.5	1.6	3.9	25

Table (4): Phenology and height of the range species studied in eight community types during spring season in Bagbag area. H= mean height of the plant (cm), GS= growth stage of the plant, Vg= vegetative, fl= flowering Pf= Preflowering, D= dormant

Range Species	Communities																Heig of
	H	GS	H	GS	H	GS	H	GS	H	GS	H	GS	H	GS	H	GS	
<i>G. decander</i>	9.9	Vg	11.7	Vg	13.7	Pf	8.9	Vg	10.0	fl	16.7	fl	10.3	fl	15.3	fl	10.6
<i>H. lippii</i>	8.1	Vg	-	-	7.3	Vg	6.6	Vg	10.0	fl	9.7	fl	9.8	Vg	7.0	Vg	8.4
<i>E. fruticosum</i>	6.0	Vg	6.3	Pf	-	-	-	-	12.7	fl	9.0	fl	11.3	fl	6.0	Vg	8.6
<i>D. tortuosa</i>	13.4	Pf	13.7	Vg	22.3	Vg	20.2	Vg	23.3	fl	16.3	fl	11.3	fl	9.3	fl	16.2
<i>P. angustifolia</i>	46.7	Pf	-	-	-	-	41.5	Vg	-	-	-	-	-	-	-	-	44.1
<i>L. shawii</i>	26.7	Vg	-	-	-	-	-	-	-	-	-	-	-	-	23.3	Vg	25.0

Table (5): Nutritive value of the studied range perennial species in Bagbag area during spring (CP= crude protein, CF= crude fiber, NFE= nitrogen free extract, EE= ether extract, TDN= total digestible nutrients, DCP= Digestible crude protein).

Plant species	CP %	NFE %	CF %	EE %	Ash %	TDN %	DCP %	water content %
<i>Deverra tortuosa</i>	4.3	22.5	36.7	8.1	19.5	53.13	0.48	37.5
<i>Lycium shawii</i>	15.8	26.6	32.3	9.2	52.2	59.98	11.2	51.6
<i>Helianthemum lippii</i>	10.2	21.6	36.8	8.4	24.3	55.75	5.97	42.6
<i>Echinochilon fruticosum</i>	7.1	41.3	29.9	8.8	22.3	56.97	3.08	39.8
<i>Gymnocarpos decander</i>	3.9	42.0	18.7	7.5	23.6	59.65	0.11	44.6
<i>Periploca angustifolia</i>	20.3	4.3	28.4	8.1	4.5	63.48	15.36	56.9

DISCUSSION

Rangelands occupies an estimated 90% of the total area of such Mediterranean coastal zone (Duivebbooden, 1985). Eight plant community types are distributed in Bagbag area. These communities are: *A. ramosus*, *T. hirsuta*, *D. tortuosa*, *S. capensis*, *L. spartum*, *P. albicans*, *H. scoparium* and *H. scoparium - T. Hirsuta*. These communities form the major communities belong to the association of *T. hirsuta* and *G. decander* which occupies the rocky ridges habitat. Domination of such community types depend upon soil moisture availability and the deepness of soil (Tadros and Atta, 1958, Zahran and Willis, 1992). The Mediterranean desert (west area of Alexandria city) is vegetationally and floristically considered as the richest parts in Egypt (Ayyad, 1978). Sixty six species were recorded in the study area of which the woody species were the most abundant life-forms. The highest numbers of species were recorded in the communities dominated by *A. ramosus*, *H. scoparium* and *H. scoparium - T. hirsute* due to the higher percentage of soil moisture content in case of *A. ramosus* community type and the high values of CaCO₃ and organic matter in the communities of *H. scoparium* and *H. scoparium - T. hirsute*. Similar results were obtained by Long (1955); Zahran *et al.* (1990); Crawley (1997) Elkhoully and Fakhy (1999).

Forty four palatable species were recorded in the study area including 17 species were highly palatable and 27 species were recorded as palatable species by Heneidy & Bidak (1996); Elkhoully & Hendawy (1999) and Heneidy (2002). The palatable species that were recorded by these authors include 7 perennials and most of the annuals in the study area. The palatable perennials are: *A. ramosus*, *Farsetia aegyptia*, *Salsola tetrandra*, *Scorzonera undulate*, *Echinops spinissimus*, *Halaxylon scoparium* and *Suaeda vermiculata*. The pasture condition is based on many factors, as biomass, accessible parts (actual production) for the livestock, palatability, type of life-forms and the plant species condition (performance of plant species, availability

of the plant species, nutritive value, topographic factor and soil type) as well as actually field observation (Heneidy, 2002). According Le Houërou (1993) the pasture condition is divided into three categories (good, fair and poor). The increase of the total number of palatable species (66.7% of the total number of species) especially the perennials (36.4% of the total number of species) indicated that the pasture condition in the study area is generally good. Eight palatable species in the study area had the lowest values of IV and density, which indicated that these species are endangered as a result of overgrazing. These species are *Lotus creticus*, *Kickxia aegyptiaca*, *P. angustifolia*, *L. shawii*, *Atriplex halimus*, *Medicago polymorpha*, *Hippocrepis cyclocaropa* and *Trigonella stillata*. The long term heavy grazing caused reduction in the cover of the palatable species (Dregne, 1995 and Krahulec *et al.*, 2001).

The low presence, importance value and density of *P. angustifolia* and *L. shawii* is attributed the fact that these species are subject to overgrazing because their higher palatability than other recorded species. These species attained the highest percentage of CP, DCP, TDN and plant moisture content and the lowest percentage of CF. The term TDN is an approximate measure of the food available to animal after the digestion losses have been deducted (Lofgreen, 1951). The CP and CF are viewed classically as an indicator of the nutritional value of plant as feed for ruminants (Bryant and Kuropat, 1983; Heneidy, 1992). Its well noticed, *D. tortuosa* and *G. decander* had the highest presence, importance value and density within the recorded species because of their less palatable than the other species. These species which contained the lowest percentage of CP, DCP and plant water content; also, *D. tortuosa* had the lowest percentage of TDN and the highest percentage of CF among the studied species. The reasons of plant impalatability are: low content of nitrogen and protein, toughness of their leaves, the plants are lignified and fibrous, and rich in cellulose (Tallamy & Raupp, 1991; Rosenthal & Berenbaum, 1992 and Karban & Baldwin, 1997). Comparing the data of digestible the nutrient values of the studied range species with those recorded by other authors indicated that, the average value of DCP content in the studied species (6.0%) was more than that what was obtained by Heneidy, 1992 and 1996 (4.9% and 4.6, respectively) in the western Mediterranean coastal area and Aqaba Gulf area of Sinai. Also, the average value of TDN in the studied range species contained relatively similar value (62.7%) of supplementary feed (berseem, barley and corn), which was noticed by Soliman & El-shazly (1978).

CONCLUSION

- The reasonable of the high number of palatable perennial forage species indicates that the pasture condition in this study area is generally good, and vegetation potential has not been destroyed, so there are some chances of its improvement and development.
- The studied species can be ranked according to their palatability and contents of DCP, TDN and moisture content as follows: *P. angustifolia*, *L. shawii*, *E. fruticosum*, *H. lippii*, *G. decander*, and *D. tortuosa*
- Most of the palatable species are characterized by low importance value IV and density, and most of them were in dwarf form due to heavy grazing.

RECOMMENDATIONS

- Complete protection for at least 5 consecutive years in some sites of the communities of *A. ramosus* and *S. capensis* including the species of *P. angustifolia* and *L. shawii* as associate species should be conducted for achieving reasonable improvement in their potentialities as promising range lands.
- It could be advisable to reseed, or establish mother plants for the endangered highly palatable species as *P. angustifolia*, *L. shawii*, *Lotus creticus*, *Kickxia aegyptiaca*, *Atriplex halimus*, *Medicago polymorpha*, *Hippocrepis cyclocaropa* and *Trigonella stillata* specially in soils deep enough to make available adequate soil moisture content such as in the habitat of *A. ramosus*, *D. tortousa*, *H. scoparium* and *H. scoparium* - *T. Hirsuta* community types.
- It is anticipated to apply modified new techniques for water harvest in this study area for cultivation of the range species mentioned above and to promote propagation and seedling growth of the range plants.
- Carrying capacity of the study area should be beautified to put a suitable plan for improvement and development of this studied area.

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الإمكانات الرعوية الطبيعية لمنطقة بقبق بالساحل الشمالي الغربي لمصر

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النباتات النامية بمنطقة بقبق تتكون من ثمانية مجموعات لأنواع نباتية تسودها الأنواع الآتية: (بصل العنصل - المتتان - القزاح - الإسمتيا - الحلفا - الأتم والرمث).

هذا وقد تم تسجيل ١٧ نوعا من هذه المجموعات النباتية تحت قائمة الأنواع التي ترعى (مستاعاة) منهم ١١ من الأنواع التي تثمر كل عامين (حولين)، و٦ من الأنواع الحولية.

وقد تم إختيار ٦ من الأنواع ذات الحولين والمستاعاة من تلك المنتشرة فى منطقة الدراسة لتقدير مدى إمكانية إستخدامها فى تنمية المراعى بهذه المنطقة وهى: (لعجرم - القضيب - الشويكة - القزاح - أم اللبن - والعوسج) وكلها ذات كثافة نسبية عالية وتتمتع كذلك بقيمة إقتصادية عالية بالمقارنة بالأصناف التي تمت دراستها من تلك النباتات المستاعاة، بينما يعتبر نبات القضيب هو الأكثر فى الكثافة النباتية والقيمة الإقتصادية.

أما أعلى نسبة بروتين خام (CP)، (TDN)، (DCP) فقد وجدت فى الأجزاء التي يتم رعيها بواسطة الحيوانات فى نوع القضيب، يليها نبات العوسج. وقد وجد أن معظم الأنواع المستاعاة تتمتع بقيمة منخفضة (IV) وكذا إنخفاض فى الكثافة وتكون متقرمة نظرا للحرى الجائر وبالرغم من أن ظروف الرعى بالمنطقة التي تحت الدراسة تعتبر عالية بشكل عام إلا أن مستقبل المساحات الخضراء والنموات المستقبلية يعتبر مبشرا وواعدا، كما أن هناك فرص لتحسين وتطوير المراعى لتلك المنطقة.