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EFFECT OF ENVIRONMENTAL PARAMETERS ON THE BIOLOGICAL COMPONENTS OF *Anabasis articulata* UNDER CONDITION DIFFERENT HABITATS.

Salem, Nahed A. E.
Desert Research Center

ABSTRACT

Anabasis articulata was studied at two habitats, El- Quesyma and Matruh. The mean height and water content of *Anabasis articulata* at Matruh were higher than that at El- Quesyma.

The soil was sandy loam at surface and bottom layers, respectively at El-Quesyma habitat, while it was clay loam and sandy clay loam at the surface and bottom layers at Matruh habitat. Soil moisture was higher was higher in Matruh than that El- Quesyma, slightly alkaline in reaction at both habitat. Calcium ions the first major component, magnesium ions the second major component of the soil supporting *Anabasis articulata*. The major anion of soil was chlorides.

The vegetation analysis revealed that *Anabasis articulata* was the major plant at El- Quesyma habitat, while it was the third plant at Matruh habitat.

Concerning the metabolic products studies, it was found that the percentage of total nitrogen, total protein, total lipid and total, soluble and insoluble carbohydrates were higher in the leaves than those in the stems at both studied habitats , while they were higher at Catherin than those at Wadi Fieran habitats.

Keywords: *Anabasis*, Chenopodiaceae, ecological studies.

INTRODUCTION

Many plants of family chenopodiaceae are used in medicine as antimicrobial remedies, where crude preparation of such plants are used in different forms for oral and external local application to treat microbial infections.

Herbs, often fleshy, with simple sepaloid, not scarious, persistent perianth of 5 segments or less, stamens 5 or less opposite perianth- lobes; ovary of 2 carpels, 1 loculed with 1- numerous ovules; fruit a nut.

Mouris, *et al* (1977) reported that *Anabasis articulata* collected from 12 locations in the N. of the Egyptian Western Desert were analyzed for chemical composition. There was a significant difference in carbohydrate, total N, ether extract, ash, Na and K content between locations. The mian factors affecting the compositions were soil properties.

Details are given of the wood quality of plants native to the western Mediterranean costal land of Egypt. The dominant species are *Thymelaea hirsuta, Gymnocarpos decandrum, Anabasis articulata, Lycium arabicum, Ononis vaginalis, Retama raetam, Artemisia monosperma* and *Atriplex halimus*. (Aly and El- Darier, 1992).

Batanouny and Zaki (1973) found that the *P. albicans* community had the highest rangeland potential, followed by *A. herba – alba* (usually overgrazed), *S. tetrandra*, *A. articulata* and *G. decandrum*. The *S. tetrandra* and *A. articulata* associations gave little keep in summer whereas *G. decandrum* did not show a sharp reduction in potential.

Gravel desert was characterized by communities dominated by *Haloxylon salicornicum*, *Panicum turgidum*, *Artemisia monosperma*, *Lasiurum hirsutus* , *Zilla spinosa* and *Mesembryanthemum forskalei*. *Pennisetum dichotomum* was among the species charactristic of wadis. On the sandy plains between Cairo and Alexandria the vegetation (sparse in the S., dominated by Aristida plumosa, cover < 5% , rainfall 30 mm) increased in density with increasing rainfall to about 40 % cover (*Anabasis articulata* communities rainfall 150 mm). Costal dunes were characterized by *Ammophila arenaria* and *Agropyron* Junceiforme on loose substrate and *Ononis vaginalis* on fixed dunes. Sandy plains S. of the costal dunes carried a Plantago albicans / Echiochilon fruticosum association on deep loose soil, an *Artemisia heba – alba* association on shallow soils and a sparse cover (15 – 40 %) of *Haloxylon articulatum* and *Anabasis articulata* on very shallow soils. Batanouny (1973).

MATERIAL AND METHODS:

Ecological studies

1. Environmental condition

The mean values of climatic factors for both investigated habitats were obtained from the Meteorologigal Department of Egypt during the period of investigation.

2. Edaphic factors:

Soil profiles supporting *Anabasis articulata* were samples close to naturally growing plants. The soil profile samples were collected for physical and chemical analysis from soil supporting *Anabasis articulata* at two depth (0-20, 20-40 cm).

2.1.Soil physical properties (Granuleometric analysis)

Soil texture was determined by the sieve method (Jackson, 1968). The soil moisture content was determined at two depth (0-20 cm and 20-40 cm) using the method described by Rowell (1994).

2.2. Soil chemical properties: Anion determination

Suphates were precipitated as barium sulphate (Jackson, and Blunaell, 1963).

Chlrides were determined according to the method described by Brower and Zar (1984).

Carbonate and bicarbonates ions were determined by titration against 0.1 NHCl according to Rowell (1994)

Cation determination

Sodium and potassium ions were measured using the flame photometer according to Brower and Zar (1984). Calsium and magnesium were measured by titration against EDTA (Brower and Zar, 1984).

Electrical conductivity (E.C) of the soil was measured by electrical conductivity meter (Rowell, 1994).

3. vegetation analysis:

The structure of vegetation of *Anabasis articulata* at the two habitats was analyzed sociologically according to Kassas and Zahran (1965), Migahedetd (1971, 1974) and Sharma (1981). The frequency index (Fr%), frequency classes (Fr C.) and frequency diagram were compiled and calculated according to Ambasht (1986).

Metabolic products.

The total ash content was determined according to British pharmacopoeia (1980).

The total, soluble and insoluble carbohydrates in the plant were determined according to Chaplin and Kennedy (1994).

The total nitrogen content was determined by micro Kjeldahl method according to British Pharmacopoeia (1980.)

RESULTS AND DISCUSSION

Ecological studies

During the period of investigation, it was observed that the plant is woody shrub with a great resemblance to *Hammada elegans*, but internodes shorter, thicker, more tortuose and not during yellow. Wings large, yellow or rose, rotate. (Fru.)- very common. The Oases of the Libyan desert. The Mediterranean coastal strip from El- Sollum to Rafaah. All the deserts of Egypt. Sinai proper, i.e. South of El- Tih desert. In strog deserts. (Tackholm 1974).

Table (1) show that the maximum value of the mean height of *Anabasis articulata* was 83.6 cm and 90.3 cm in spring at El- Quesyma and Matruh respectively. While its minimum value was 61.9 cm and 76.8 cm in summer at El- Quesyma and Matruh respectively.

The results revealed that the mean height of *Anabasis articulata* at Matruh was higher than that at El- Quesyma.

1. Water content:

Data presented in Table (2) indicate that percentage water content of *Anabasis articulata* was higher in winter than in summer at the two habitats. The percentages of water content reached its maximum values (76.23% and 48.46%) in winter and the minimum values (29.51% and 18.83%) in summer at Matruh and El- Quesyma habitats respectively.

Table (1): The average height of *Anabasis articulata*

Season	Mean height cm	
	El- Quesyma	Matruh
Witer 2002	77.2	83.4
Sring 2002	83.6	90.3
Summer 2002	61.9	76.8
Autumn 2002	65.4	80.7

Table (2): Mean values of water content in *Anabasis articulata*

Season	Water cotent %	
	El- Quesyma	Matruh
Witer 2002	48.46	76.23
Sring 2002	33.32	64.48
Summer 2002	18.83	29.51
Autumn 2002	27.65	45.76

2. Climatic factors:

The climatic factors serve as an important factors for determining the development distribution and density of vegetation of plant on earth (Zahran, 1989). The climatic data indicate that the mean maximum temperature ranged from (34.4 and 31.5 °C) in July to (17.2 and 16.3 °C) in January at El-Quesyma and Matruh habitats. On the other hand the mean minimum temperature renged between (22.0 and 23.4 °C) in August and (8.5 and 8.4 °C) in January at El- Quesyma and Matruh habitats respectively, Table (3).

Data revealed that the relative humidity ranged between (77.0 and 62.7%) in January and November at El- Quesyma habitat, while it ranged btween (73.7 and 61.0%) in June and October at Matruh habitat. Table (3)

Table (3) :Mean values of climatic particular for Matruh during the period of investigation (2002).

Monthes	Teperature		Relative Hu%	Water vapor Km/h	Wind speed Kont	Rainfal (mm) .
	Mean Max.	Mean Min.				
January	16.3	8.4	73	10.4	10.9	18.5
February	19.0	10.0	71.7	11.5	8.7	2.5
March	20.3	11.6	69.7	12.7	9.3	0.2
April	26.1	13.2	62.3	12.9	8.2	3.7
May	25.1	18.6	72.3	17.3	7.8	0
June	27.5	18.6	73.7	21.3	7.6	0
July	31.5	23.3	70.3	25.3	7.8	0
August	31.0	23.4	64.7	23.5	7.4	0
September	31.5	22.2	65.3	22.4	7.1	0
October	27.1	18.7	61.0	17.1	6.9	4.0
November	23.9	14.4	64.7	14.1	7.1	2.3
Desember	20.2	10.9	66.7	11.4	9.5	9.4
Mean values of climatic particular for El- Quesyma during the period of investigation (2002)						
January	17.2	8.5	77.0	10.5	5.4	14.8
February	21.6	8.8	72.7	12.0	4.5	3.7
March	24.1	11.0	67.7	13.4	5	4.0
April	25.1	12.7	65.0	13.5	4.5	0.8
May	27.8	14.6	69.0	16.7	3.2	0.1
June	30.9	18.4	69.3	21.5	3	0
July	34.4	21.4	71	25.7	4	0
August	33.6	22.0	69	25.9	2.8	0
September	32.3	20.0	67.7	22.6	3.1	0
October	29.1	18.1	72.7	20.9	2.9	0.9
November	26.7	12.3	62.7	13.7	3.4	0.1
Desember	21.1	9.9	69.3	11.6	5.3	8.8

The water vapour pressure varied between (25.9 and 10.5 H.P) in August and January at El- Quesyma habitat, while it was ranged between (25.3 and 10.4 H.P) in July and January at Matruh habitat. Table (3).

The wind velocity varied from 5.4 Kont/hour in January and Desember to 2.8 Kont/hour in August at El- Quesyma habitat, while it ranged between 10.9 Kont/hour in January to 6.9 Kont/hour in October at Matruh habitat. Table (3). The maximum value of rainfall was (14.8 and 18.5 mm) in January at the two habitats, meanwhile minimum value of rainfall was 0.1 in May and November at El- Quesyma habitat and 0.2 in Matruh at Matruh habitat. Table(3).

Edaphic factors:

1 Physical properties of the soil (Granuleometric analysis).

Soil texture:

Results of granuleometric analysis of the soil supporting *Anabasis articulata* indicated that the soil was sandy loamy in the surface and bottom layers respectively at El- Quesyma habitat, while it was clayloam and sandy clay loam in the surface and bottom at Matruh habitat Table (4).

The soil moisture content Table (5) show the seasonal variation which reached its maximum values (4.03 and 6.06%) in winter at the bottom layer (20-40cm) and its minimum values (0.67 and 1.51%) in summer at the surface

Table (4): Granuleometric analysis of the soil supporting *Anabasis articulata* at two habitats:

Locality	Depth cm	Soil texture	Granuleometric analysis of soil mm%				
			Fin gravel (1-2 mm)	Coarse sand (1-0.5 mm)	Fine sand 0.25-0.125 mm)	Silt 0.125-0.063 mm	Clay <0.063 mm
El-Quesyma	0-20	Sandy loam	6.1	37.10	26.0	18.2	12.6
	20-40	Sandy loam	16.9	32.50	12.5	22.8	15.2
Matruh	0-20	Clayloam	3.60	5.51	30.06	28.42	32.13
	20-40	Sandy Clay loam	7.20	13.01	41.26	17.00	21.48

Table (5):Mean values of soil moisture content of *Anabasis articulata* at two habitats:

Locality	Depth cm	Soil moisture contents %			
		Winter	Spring	Summer	Autumn
El-Quesyma	0-20	2.89	1.83	0.67	0.68
	20-40	4.03	3.08	0.97	0.95
Matruh	0-20	5.09	2.71	1.51	3.20
	20-40	6.06	3.80	2.60	4.78

Samples (0-20 cm) at El- Quesyma and Matruh habitat, respectivly, which were associated with drought high rates of evaporation and relative humidity.

The date show that there was a general trend in all season for increase in soil moisture content with increase in soil depth. This may be attributed to the fact that the surface layer of the desert soil were subjected to intense evaporation while the deeper layer were protected against evaporation.

The soil moisure conent was higher at Matruh habitat than that at El-Quesyma habitat.

2 Chemical properaties of the soil.

2.1. Cation contents:

Calcium ions from the major the component of the soil supporting *Anabasis articulata* at the two layers at both habitats.

Its ions cocentration was relatively high. It ranged between (3.55 and 26.6 meq/100g), at the top layer and (4.91 and 11.2 meq/100g), at the bottom layer at El- Quesyma and Matruh habitats respectively Table (6).

Imamul-Hug and Larther (1984) recorded that Ca^{++} lowered proline content which is an indicator for stress severity Ca^{++} has a role in the maintence of membrane integity (leopold and willing, 1984), stated that Ca^{++} is an important factor in the resistance of plants to salinity-energy which is used in osmoregulation and maitenance respiration, would be alternatively utilized for growth in the presence of Ca^{++} .

Mgnesium ions from the second major component of the soil . its ion concentration ranged between 2.89 and 1.52 meq/100g, at surface and bottom layers respectively at El- Quesyma and between 9.1 and 5.2 meq/100g, at surface and bottom layers respectively at Mtruh.

It was observed that sodium ions concentrations were higher at the surface and bottom layer at Matruh habitat than that at EL-Quesyma habitat .

It was observed that K^{+} was relatively low in the two studied areas Table(6).

2.2. Anion contents:

Table(6) shows that the soluble carbonates, were present as traces at El- Quesyma in the two layer, while it ranged between (0.82 and 1.30 meq/100g) at Matruh. On the other hand the maximum value of bicarbonates was 1.69 and 2.12 meq/100g in the surface soil layer and the bottom soil layers at El- Quesyma and Matruh habitats, respectively.

The chlorides contents of the soil sample reched its maximum value of 3.18 and 5.83 meq/100g in the surface soil layer while it reached its minimum value of 2.60 and 3.41 meq/100g in the bottom layer at the two habitats, respectively.

The salinity at Matruh habitat was relativiely high than that of EL-Quesyma ,which may be due to the increase in chloride and sodium ions at Matruh habitat .These result are inagreement with those obtained by Brwer and Zar (1984) and by Abd El-Rahman et al ., (1971).

The sulphates content of the the soil sample reached its maximum value of 1.58 and 1.96 meq/100g in the surface layer and its minimum value of 0.30 and 1.52 meq/100g in the bottom layer at El- Quesyma and Matruh habitats, respectively. Table (6).

3. PH value and electrical conductivity of the soil:

The soil was slightly alkaline in reaction at the both habitats. The electrical conductivity (E.C.) ranged between 0.74-1.33 and 4.3-9.6 mmhos/cm in the surface and bottom layers at the two habitats, respectively. Table(6).

Table (6): Chemical analysis of the soil associated with *Anabasis articulata* at the two habitats.

	Depth	PH	E.C.	analysis of the soil saturation extract.							
				Soluble cations meq/100mg				Soluble anions meq/100mg			
				Ca^{++}	Mg^{++}	Na^{+}	K^{+}	CO_3^{--}	HCO_3^{-}	Cl^{-}	SO_4^{--}
El-	0-20	7.5	0.74	3.55	2.89	0.89	0.37	Traces	1.69	3.18	1.58
Quesyma	20-40	7.7	1.33	4.91	1.52	0.67	0.25	Traces	1.47	2.60	0.30
Matruh	0-20	7.5	9.6	26.6	9.1	7.52	0.81	0.82	2.12	5.83	1.96
	20-40	8.2	4.3	11.2	5.2	5.01	0.62	1.30	1.65	3.41	1.52

4. Vegetation analysis :

Table (7) shows that the dominant species at Matruh was *Euphorbia retuse*, *Zygophylum coccinium,* followerd by *Anabbasis articulata* with frequency indices of 100%, 100% and 90% in winter with class 5. While frequency of *Anabbasis articulata* was 90%, 75% and 80% in spring, summer and autumn respectively with frequency class 5 and 4.

Table (8) clear that the dominant speceis at El- Quesyma was *Anabbasis articulata* with frequency 100% in winter and spring while 90% in summer and autumn with class 5 followed by *Polygonum equisetiforme* and *Salsola tetrandra.*

Table (7):Floristic composition of stand of 20 quadrats (10×10m)represennting *Anabbasis articulata* in El-Quesyma habitat.

Species	Winter					Spring					Summer					Autumn				
	Total No.	Fr%	Fr c	D	R.D. %	Total No.	Fr%	Fr c	D	R.D. %	Total No.	Fr%	Fr c	D	R.D. %	Total No.	Fr%	Fr c	D	R.D. %
Euphorbia retuse	510	100	5	25.5	35.7	420	100	5	21	32.1	320	90	5	16	31.2	490	100	5	24.5	36.7
Zygophylum coccinium	336	100	5	16.8	23.5	260	90	5	13	19.8	215	80	4	10.8	20.9	315	100	5	15.8	23.6
Anabasis articulata	140	90	5	6.5	9.1	137	90	5	7.5	11.4	110	75	4	4.5	8.8	105	80	4	5.8	8.6
Alhagi maurarum	130	80	4	7.0	9.8	150	85	5	6.9	10.4	90	75	4	5.5	10.7	115	80	4	2.3	7.9
Fagonia cretica	62	75	4	3.1	4.3	65	75	4	3.3	5.0	45	50	3	5.3	4.4	54	75	4	2.7	4.0
Zilla spinosa	40	55	3	2.0	2.8	45	50	3	2.3	3.4	38	45	3	1.9	3.7	75	40	2	3.8	5.6
Hyoscamus muticus	90	50	3	4.5	6.3	100	50	3	5	7.6	87	45	3	4.4	8.5	45	40	2	2.3	3.4
Launea spinoso	50	35	2	2.5	3.5	48	25	2	2.4	3.7	45	25	2	2.3	4.4	55	20	1	2.8	4.1
Erombium aegyptiaca	30	25	2	1.5	2.1	50	25	2	2.5	3.8	40	25	2	2.0	3.9	46	35	2	2.3	3.4
Hildropium dignum	35	25	2	1.8	2.4	30	20	1	1.5	2.3	27	20	1	1.3	2.6	28	25	2	1.4	2.1
Gomphocarpus sinaicus	5	15	1	0.3	0.35	7	25	2	0.4	0.5	5	15	1	0.25	0.35	6	15	1	0.3	0.4

Table (8): Floristic composition of stand of 20 quadrats (10×10m)represennting *Anabbasis articulata* in Matruh habitat.

Species	Winter					Spring					Summer					Autumn				
	Total No.	Fr%	Fr c	D	R.D. %	Total No.	Fr%	Fr c	D	R.D. %	Total No.	Fr%	Fr c	D	R.D. %	Total No.	Fr%	Fr c	D	R.D. %
Anabasis articulata	150	100	5	7.5	13.5	160	100	5	8.0	12.7	110	90	5	5.5	13.4	125	90	5	6.3	15.3

Metabolic products:

1. Ash content:

It was obvious from Table (9) that the percentages ash content of *Anabasis articulata* was higher in summer at the two habitats . The maximum values (10.32 and 8.68 %) in summer and the minimum values (3.63 and 3.14 %) in winter at El-Quesyma and Matruh habitats, respectively.

2. Total carbohydrates

Data indicated that the rise of ash content in the two habitats during summer may be due to the increase of total ion accumulation as a result of increasing soil moisture stress (El-Monayeri, *et al.* , 1981) which agreed also with Stocker's assumption (1960).

It is clear from Table (9) that the percentages of the total, soluble and insoluble carbohydrates of *Anabsis articulata* were higher during winter than those of summer at the two habitats.

The increase in soil moisture stress decreased the photosynthesis, which was associated with an increase in respiration rate and led to the reduction in the total carbohydrates concentration in plant. These results were ingreement with those obtained by Stocker (1960), Abd El-Rahman *et al.* , (1971) and El-Monayer *et al.* , (1981).

Table (9): Metabolic products in *Anabasis articulata* at two studies habitats

Item	Season	El-Quesyama	Matruh
Ash content%	Winter	3.63	3.14
	Spring	6.34	5.21
	Summer	10.32	8.68
	Autuer	8.76	7.31
Total carbohydrates g/100g dry wt.	Winter	1.56	2.98
	Spring	1.08	2.03
	Summer	0.56	0.89
	Autuer	0.92	1.31
Soluble carbohydrates g/100 dry wt.	Winter	0.63	1.13
	Spring	0.36	0.83
	Summer	0.21	0.37
	Autuer	0.32	0.52
Insoluble carbohydrates g/100g dry wt.	Winter	0.93	1.85
	Spring	0.72	1.20
	Summer	0.35	0.52
	Autuer	0.60	0.79
Total nitrogen%	Winter	0.93	2.58
	Spring	0.82	2.30
	Summer	0.61	1.05
	Autuer	0.78	1.86

3. Total nitrogen:

Data presented in Table (9) indicated that the percentage of total nitrogen of *Anbasis articulata* reached its maximum values of 0.93 and 2.58 % in winter and its minimum values 0.61 and 1.05 % in summer at El-Quesyma and Matruh habitats, respectively.

It may be considered that the higher amount of total nitrogen content in winter was due to the increase of metabolic rate of *Anabasis articulata* as a result of high water resources of the soil during winter months than that during dry periods which accounts to Stocker's assumption (1960).

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تأثير المتغيرات البيئية على المركبات الحيوية لنبات طرطير أو عجرم (أناباسس ارتيكيولاتا) تحت ظروف بيئية مختلفة.

ناهد عبد الرؤوف السيد سالم

مركز بحوث الصحراء- المطرية- القاهرة.

تضم الفصيلةالرمرامية كثير من النباتات ذات الاهمية الاقتصادية و الطبية والتى تتميز بانها غنية بالمواد الفعالة من فلافونيدات و تانينات و صابونينات وقلويدات وترجع الأهمية الطبية لهذه العائلة إلى وجود مواد تعمل على طرد الغازات والديدان والمساعدة في الهضم و علاج للمعدة و كذلك علاج للحمى الروماتزمية كما يحتوي الرماد على أملاح قلوية تعمل على معادلة الحموضة ولذلك فقد تم اختيار نبات أناباسس أرتيكيولاتا أحد أنواع هذه الفصيلة المنتشر في منطقتي القصيمة و مطروح لدراسة مكونات النبات الكيميائية

ووجد من الدراسة أن متوسط ارتفاع النبات و محتوى النبات من الرطوبة أعلى في منطقة مطروح عنها في منطقة القصيمة و بتحليل التربة وجد أنها رملية طمية في الطبقة السطحية و العميقة في منطقة القصيمة بينما كانت طمية طينية و رملية طمية طينية في الطبقة السطحية و العميقة في منطقة مطروح.

و كانت رطوبة التربة بمنطقة مطروح أعلى منها في منطقة القصيمة و تميل للقلوية في كلا المنطقتين و كان عنصر الكالسيوم هو الكاتيون الرئيسي بينما يمثل الماغنسيوم العنصر الثاني في التربة المتواجد بها النبات و كانت الكلوريدات هي الأنيونات السائدة و بتحليل الكساء الخضري وجد أن نبات أناباسس ارتيكيولاتا هو النبات السائد في منطقة القصيمة بينما كان النبات الثالث في منطقة مطروح.

وبدراسة محتوى النبات من الكربوهيدرات الكلية والذائبة والغير ذائبة والنيتروجين كانت اعلى في فصل الشتاء عنها في فصل الصيف في كلا المنطقتين كما ارتفع محتوى النبات من الرماد الكلي في القصيمة في فصل الصيف عنة في منطقة مطروح .