

NATURAL VEGETATION SURVEY IN DIFFERENT SITES OF EL-SHEIKH ZUWIED DISTRICT (NORTH EASTERN COAST OF EGYPT)

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ABSTRACT

This study is dealing with the phytodiversity under some ecosystems of El-Sheikh Zuwied area (north Sinai). This study was carried out during the two annuals, 2002 and 2003.

They were found 23 spp. In different sites, 10 of them were annual plants and 13 were perennials, the later group contained 6 species of shrubby woody and 7 were perennial herbs (*Ruppia maritima*, *Cardaria draba*, *Thymelaea hirsuta*, *Tamarix aphylla*, *Lycium europaeum*, *Solanum elaeagnifolium*, *Caalligonum comosum*, *Frankenia revoluta*, *Silene succulenta*, *Achillea fragrantissima*, *Artemisia monosperma*, *Artactylis carduus* and *Sphaeranthus abyssinicus*), (*Chenopodium murale*, *Salsol kali*, *Convolvulus siculus*, *Malva parviflora*, *Spergula fallax*, *Mesembryanthemum nodiflorum*, *Chrysanthemum coronarium*, *Avena sativa*, *Hordeum-leporinum* and *Schismus barbatus*).

Under inland plateau, sites 1, 2 and 3, during Spring season, the perennials were 2, 7 and 7 respectively, but during Autumn, it was found 2, 3 and 2 species only. At the same time, it was found, 5, 5 and 4 annual species during Spring respectively, as well as 2, 1 and one during Autumn.

This survey may lead to suitable conservation of such natural plants, as the heavy collections of woody shrubs may lead to minimized the phytodiversity in this location districts and extreme grazing may also lead to the same effect.

The study must be extended not only to found the suitable conservation of such phytodiversity but also to increase this diversity.

The absence of many plant species in some sites and during the drought seasons may be related to extreme collections of woody plants or to the heavy grazing of annual plants.

It was found 6 perennials under subcostal sand dunes (site 4) during Spring season and 3 during Autumn, but under the conditions of coastal plain (site 5), the perennials were 6 and 5 during Spring and Autumn respectively. Under coastal sand dunes it was found two and three species of annuals during Spring and Autumn, while these species were 4 and 2 during Spring and Autumn under the conditions of coastal plain (site 5). These findings indicated great variations between the tested sites and examined seasons of the phytodiversity. The vegetation analysis was discussed also.

Keywords: Natural vegetation – survey – sand dunes habitat – north eastern tura coast- density – frequency-perennial & annual plants – palatable species- Botanical composition- plant distribution

INTRODUCTION

Arid and semi-arid regions account for about 30% of total global Land surface, and could contribute significantly to agricultural production. The north eastern coast of Egypt extends along El-kantara, to Rafah with length of about 200 km and depth about 20 km from the seashore to the south. This

district is deliberated in annual winter rainfall ranged from (150-200 mm) whilst the inland desert is mostly dry during whole seasons. El-shayeb *et al.*, (1998) found that natural plant communities, are completely differed under salty land habitat and sand plain condition. Plant populations in north Sinai were the subject of many workers (Khedr, 2000, Abd El-Hamid *et al*, 2005 a&b). They also concluded that there were many factors play an important role on such plant communities which included climatologically, meteorological and edaphic factors. The meteorological factors are changed from one season and from annual to anothers.

The present study is dealing with the population of natural plant species and vegetation analysis in five cites of El-Sheikh Zuwied destric, which include inland plateau; sub coastal sand dunes and coastal plain habitats.

MATERIALS AND METHODS

Before discussion of materials and methods, it was thought advisable to discuss some of environmental factors under these sites in terms of meteorological and edaphic factors. (see tables, 1,2 and 3)

It is uneven occasional short rainstorms usually occur in winter, where most of the days are sunny and generally mild in temperature.

The precipitation is mainly during October to April. The relative humidity in such coastal belt is generally high especially during winter, while the highest evapotranspiration (ET) is usually during Spring and summer. Means of some meteorological date for studied area are recorded in Table (1).

Table (1): Monthly meteorological data, as means of two annuals, 2002 and 2003 as collected from El-Sheikh Zuwied meteorological station D.R.C.

| Month | Air Tem. (c°) | S. I.R. W/m ² | T. Rain (mm) | R.H. (%) | E. T. (mm) | W. S. (K/h) |
|-------------|---------------|--------------------------|--------------|----------|------------|-------------|
| January | 12.91 | 3.24 | 46.86 | 83.07 | 0.99 | 8.08 |
| February | 13.71 | 4.20 | 19.17 | 78.05 | 1.51 | 7.10 |
| March | 15.38 | 6.62 | 29.98 | 81.14 | 1.47 | 5.47 |
| April | 18.48 | 6.68 | 8.77 | 76.73 | 2.74 | 5.94 |
| May | 20.73 | 6.75 | 0 | 85.27 | 3.24 | 5.22 |
| June | 23.82 | 8.65 | 0 | 87.96 | 3.53 | 3.92 |
| July | 26.20 | 8.5 | 0.13 | 89.22 | 3.64 | 6.51 |
| August | 27.27 | 8.27 | 0.13 | 87.98 | 4.03 | 4.83 |
| September | 26.10 | 6.47 | 0.51 | 81.75 | 3.28 | 7.18 |
| October | 23.06 | 3.93 | 11.43 | 87.64 | 1.85 | 11.25 |
| November | 19.23 | 2.37 | 2.54 | 79.11 | 1.6 | 9.03 |
| December | 14.67 | 1.92 | 49.53 | 82.70 | 1.08 | 10.74 |
| Annual mean | 20.13 | 5.63 | - | 83.38 | 2.41 | 7.10 |
| Total | - | - | 169.03 | - | - | - |

The studied seasons were spring 2002 to autumn 2003. The relative humidity seems to be more than 80% especially during summer season. The district occupied with natural vegetation responsible for supporting sheep and goats in this region. Various plant communities grown vigorously during the wet seasons.

The present study investigates the ecological characters of plants of varied ecological habitats growing in El-Sheikh Zuwied location at five sites comprising the sand dunes, salt marshes-near the sea, coastal plain and inland plateau.

Natural range vegetation depends mainly on the rainfall, which widely varies in quantity and frequency from year to year, and during the various seasons. Moreover, various range types of plants are closely associated with the edaphic and the prevailing climatic conditions of the studied regions.

Table (2) Mechanical analysis of soil in different habitats during period from 2002-2003 annuals El-Sheikh Zuwied

| Depth (cm) | (%) Grain size (mm) | | | | | | | S.T. |
|------------|---------------------|------------------|---------------|---------------------|----------------------|-------------------|----------------|------|
| | Gravel > 2 | Coars.S 2 - 1 | M.S 1 - .5 | Fine. S .5 - .25 | V.fien.S .25-.125 | Silt .125-.063 | Clay <0.063 | |
| S1/I.L P. | | | | | | | | |
| 0-20 | - | 0.056 | 0.039 | 35.104 | 62.059 | 1.983 | 0.164 | S.L. |
| 20-40 | - | 0.046 | 0.145 | 13.130 | 46.120 | 37.415 | 3.144 | S.L. |
| 40-60 | - | - | 0.201 | 71.915 | 24.766 | 3.120 | 0.098 | L.S. |
| S2/ I.L P. | | | | | | | | |
| 0-20 | - | 0.092 | 0.143 | 39.154 | 41.048 | 6.989 | 0.534 | S. |
| 20-40 | - | 0.061 | 0.101 | 21.446 | 20.677 | 7.261 | 0.375 | S. |
| 40-60 | - | 0.085 | 0.102 | 21.832 | 54.631 | 25.419 | 2.859 | L.S. |
| S3/ I.L P. | | | | | | | | |
| 0-20 | - | 0.339 | 0.460 | 20.054 | 50.394 | 26.695 | 2.058 | S. |
| 20-40 | - | 0.183 | 1.265 | 25.189 | 46.855 | 24.896 | 1.612 | L.S. |
| 40-60 | - | 0.148 | 0.147 | 13.124 | 46.079 | 37.399 | 3.155 | L.S. |
| S4/s.c.s.D | | | | | | | | |
| 0-20 | - | - | - | 20.251 | 71.768 | 0.973 | 1.008 | L.S. |
| 20-40 | - | - | 0.024 | 30.786 | 61.078 | 7.784 | 0.328 | L.S. |
| 40-60 | - | - | 0.037 | 33.342 | 62.540 | 3.470 | 0.626 | L.S. |
| S5/C.P. | | | | | | | | |
| 0-20 | 4.216 | 1.194 | 1.969 | 21.340 | 42.322 | 27.823 | 1.136 | S. |
| 20-40 | 2.134 | 0.400 | 3.116 | 46.260 | 30.343 | 16.786 | 0.961 | S. |
| 40-60 | 0.625 | 0.153 | 0.588 | 17.508 | 50.860 | 28.150 | 1.316 | S. |

I.L.P. =in land plateau, s. c. s. D = Sub-coastal sand dunes
 C.P. =Coastal plain. S.L. = Sandy loam L.S. = loamy sand S. = Sand
 S.T. =soil Texture M. = medium V. = very

Edaphic factors

- a) Soil particles size
- b) Soil chemical analysis

Our study is dealing with two factors as follows:

- 1- **Effect of location:** -Investigation was conducted to assess range plants in three main habitats.

A-Inland plateau (site 1-2-3) 31° 12' 80" N. - 34° 7' 40" E., 31° 14' 40" N. - 34° 14' 70" E., 31° 14' 27" N. - 34° 06' 73" E. respectively.
 B-Sub-coastal sand dunes (site 4) 31° 13' 68" N - 34° 06' 40" E.
 C-Coastal plain (site 5) 31° 10' 38" N. - 33° 58' 59" E.

2-Effect of season: -

Measurements were taken during (spring) and (autumn) seasons representing the different climatic conditions throughout the year during period from Autumn 2002- to Spring 2003 seasons.

3-Vegetation determination and analysis: -

Using five clipping chart quadrates (1m ×1m) within each site were used to determine the following measurements as described by Hanson and Churchill (1965).

Density p/m^2 =Number of individual species/ area unit.

Coverage % = (Area occupied by species/ area unit x100.

Abundance %=(Number of individuals species/Total number of all species) ×100.

Frequency % = (Number occurrence of the individual species/ Number of the measured units x100.

Fresh yield (Ton/fed.) was determined by weighing the clipped stands of species individually and together.

Samples of 100gm fresh materials were dried at 70c° until constant weight for calculating dry matter percentage.

Table (3) Chemical characteristics of soil in different habitats of El-Sheikh Zuwied during period from 2002-2003 annuals

| Sites | Depth (cm) | PH | EC (m. Mhos/cm) | Soluble anions mq/l | | | | Soluble cations mq/l | | | |
|-------|------------|------|-----------------|---------------------|-------|-------|------|----------------------|------|------|------|
| | | | | SO4-- | CO3-- | HCO3- | CL- | K+ | Na+ | Mg++ | Ca++ |
| S1 | 0-20 | 8.00 | 1.2 | 0.53 | - | 4.0 | 0.5 | 0.03 | - | 2.0 | 3.0 |
| | 20-40 | 8.01 | 1.2 | 6.53 | - | 6.0 | 0.5 | 0.03 | - | 4.0 | 9.0 |
| | 40-60 | 8.14 | 1.4 | 4.54 | - | 5.0 | 0.5 | - | 0.04 | 10.0 | - |
| Mean | | 8.05 | 1.3 | 3.87 | - | 5.0 | 0.5 | 0.02 | 0.01 | 5.3 | 4.0 |
| S2 | 0-20 | 7.56 | 0.8 | 1.65 | - | 6.0 | 0.50 | 0.15 | - | 6.0 | 2.0 |
| | 20-40 | 7.82 | 0.6 | 0.22 | - | 5.0 | 0.25 | 0.30 | - | - | 5.0 |
| | 40-60 | 8.06 | 1.0 | 7.53 | - | 5.0 | 0.50 | 0.30 | - | 9.0 | 4.0 |
| Mean | | 7.81 | 0.8 | 3.13 | - | 5.3 | 0.42 | 0.25 | - | 5.0 | 3.7 |
| S3 | 0-20 | 8.07 | 0.2 | 0.21 | - | 2.0 | 0.5 | 0.06 | 0.65 | 1.0 | 1.0 |
| | 20-40 | 8.23 | 0.3 | 0.06 | - | 2.0 | 0.5 | 0.05 | 0.39 | 1.0 | 1.0 |
| | 40-60 | 8.12 | 0.2 | 0.43 | 2.0 | 1.0 | 1.0 | 0.06 | 0.37 | 1.0 | 3.0 |
| Mean | | 8.14 | 0.2 | 0.12 | 0.7 | 1.7 | 0.7 | 0.06 | 0.47 | 1.0 | 1.7 |
| S4 | 0-20 | 8.06 | 0.2 | 0.06 | - | 2.0 | 0.5 | 0.05 | 0.39 | 1.0 | 1.0 |
| | 20-40 | 8.16 | 0.2 | 3.59 | - | 1.0 | 0.5 | 0.05 | 0.04 | 1.0 | 1.0 |
| | 40-60 | 8.18 | 0.2 | 0.23 | - | 2.0 | 0.5 | 0.05 | 1.30 | 3.0 | 6.0 |
| Mean | | 8.13 | 0.2 | 1.39 | - | 1.7 | 0.5 | 0.05 | 0.58 | 1.7 | 2.7 |
| S5 | 0-20 | 8.05 | 1.2 | 1.53 | - | 5.0 | 2.5 | 0.03 | - | 4.0 | 0.5 |
| | 20-40 | 7.86 | 1.1 | 16.53 | - | 6.0 | 2.0 | 0.03 | - | 4.0 | 0.5 |
| | 40-60 | 8.27 | 1.1 | 3.53 | - | 3.0 | 2.0 | 0.03 | - | 3.0 | 0.5 |
| Mean | | 8.06 | 1.1 | 7.20 | - | 4.7 | 2.2 | 0.03 | - | 2.7 | 0.5 |

Soil samples were taken randomly from the different each sites. Mechanical analysis of soil was conducted using international pipette method as described by Piper (1950), (Table2). The chemical determinations of the saturated extract of the soil were carried out according to Jackson (1958) Table3.

Scientific name of different plant species and their classification were carried out after Tackholm (1974).

Statistical analysis

The collected data were subjected to statistical analysis according to Computer, Randomized Complete Blocks.

Duncan's Multi range test 5%

In addition, simple correlation coefficients were calculated according to the method described by Snedecor and Cochran (1980), of the collected data of plant density (plant/m²) and some specific native vegetation analysis parameters under El-Sheikh Zuwied district during 2002-2003 annuals

Soil characteristics:

Data in Table (2) show the difference between five sites in the physical and chemical properties of the studied area soil of sites 2-3-5 contained higher percentage of Gravel, coarse and fine sand, while sites 1-4 were greater in fine sand silt and clay.

RESULTS AND DISCUSSION

1-Botanical composition:

Data presented in Tables (4&5) show that, the family of Compositae include 2 palatable and 2 unpalatable perennial species, while the family of Solanaceae involved 2 palatable species. The other 7 families contained only one specie. *Artemisia monsperma* and *Tamarix aphylla* were the dominant species in Spring (wet) and Autumn (dry) seasons. Plant species (diversity) in sites (2-3 and 4-5) were higher than in other sites during wet and dry seasons. Annual native plants of Graminae family included one unpalatable and two palatable, while the family of Chenopodiaceae involved three unpalatable species. The other four families included one specie (three palatable and one unpalatable).

2- Plant density and covering percentage (Tables, 6&7)

(a) Perennial spp.

It was found great variations between the density of different plant species during the tested seasons. The highest density (plant/m²) was found by *Artemisia monsperma* especially during Autumn season. The absence of some species during Autumn may be related to extreme grazing or collections. However the plant density is considered very low under different sites.

Table (4): Effect of location and growing seasons on the botanical composition of perennial native plants grown under different sites of El-Sheikh Zuwied district during 2002– 2003 annuals (means of two seasons)

| Vernacular name | Scientific name | Family name | P/ up | Spring | | | | | Autumn | | | | | | |
|-----------------|--------------------------------|-----------------|-------|--------|-----|-----|-----|-----|--------|-----|-----|-----|-----|---|---|
| | | | | S 1 | S 2 | S 3 | S 4 | S 5 | S 1 | S 2 | S 3 | S 4 | S 5 | | |
| Reem | <i>Ruppia maritima</i> | Ruppiaceae | P | + | - | - | - | - | - | - | - | - | - | - | - |
| Losilis | <i>Cardana draba</i> | Cruciferae | P | - | - | + | + | + | + | - | - | - | - | - | - |
| Mithnaan | <i>Thymelaea hirsuta*</i> | Thymelaeaceae | Up | - | - | - | - | - | - | - | - | - | - | - | - |
| All · Traf | <i>Tamanix aphylla</i> | Tamaricaceae | Up | - | + | + | + | + | + | - | - | - | - | - | - |
| Awseeg | <i>Lycium europaeum</i> | Solanaceae | P | - | + | - | - | - | - | - | - | - | - | - | - |
| Abu shoaka | <i>Solanum elaeagnifolium*</i> | Solanaceae | P | - | - | - | - | - | - | - | - | - | - | - | - |
| Rosah | <i>Calligonum comosum*</i> | Polygonaceae | Up | - | + | - | - | - | - | - | - | - | - | - | - |
| Hemeisha | <i>Frankenia revolute*</i> | Frankeniaceae | P | - | - | - | - | - | - | - | - | - | - | - | - |
| Rooghl | <i>Silene succulenta</i> | Caryophyllaceae | Up | - | + | + | + | + | + | - | - | - | - | - | - |
| Qaysoom gebeli | <i>Achillea fragranissima*</i> | Compositae | P | - | - | - | - | - | - | - | - | - | - | - | - |
| Sheeh | <i>Artemisia monsperma*</i> | Compositae | P | - | + | + | + | + | + | - | - | - | - | - | - |
| Shoak el-gamal | <i>Atractylis carduus</i> | Compositae | Up | + | + | + | + | + | + | - | - | - | - | - | - |
| Gateefe | <i>Spharanthus abyssinicus</i> | Compositae | Up | - | - | - | - | - | - | - | - | - | - | - | - |

Up= unpalatable spp. P= palatable spp. * Frut - absent + present

Table (5) Effect of location and growing seasons on the botanical composition of annual native plants grown under different sites of El-Sheikh Zuwied district during 2002– 2003 annuals (means of two seasons)

| Vernacular name | Scientific name | Family name | P/ up | Spring | | | | | Autumn | | | | | |
|-----------------|------------------------------------|-----------------|-------|--------|-----|-----|-----|-----|--------|-----|-----|-----|-----|---|
| | | | | S 1 | S 2 | S 3 | S 4 | S 5 | S 1 | S 2 | S 3 | S 4 | S 5 | |
| Abu'eifein | <i>Chenopodium murale</i> | Chenopodiaceae | Up | + | - | - | - | - | - | - | - | - | - | - |
| Eshnaan | <i>Salsola kali</i> | Chenopodiaceae | Up | - | - | - | - | - | - | - | - | - | - | - |
| Ghobbeira | <i>Convolvulus siculu</i> | Malvaceae | Up | + | - | - | - | - | - | - | - | - | - | - |
| Khobeza | <i>Malva parviflora</i> | Caryophyllaceae | P | + | - | - | - | - | - | - | - | - | - | - |
| Khamia | <i>Spergula fallax</i> | Aizoaceae | Up | + | + | + | + | + | + | - | - | - | - | - |
| Ghasool | <i>Mesembryanthemum nodiflorum</i> | Compositae | P | - | + | + | + | + | + | - | - | - | - | - |
| Oqhowaan | <i>Chrysanthemum coronarium</i> | Compositae | P | - | + | + | + | + | + | - | - | - | - | - |
| Khaafoor | <i>Avena sativa</i> | Graminae | Up | + | + | + | + | + | + | - | - | - | - | - |
| Sha. araia | <i>Hordeum leporinum</i> | Graminae | P | + | + | + | + | + | + | - | - | - | - | - |
| Abu- Hereiba | <i>Schimus barbatus</i> | Graminae | P | + | + | + | + | + | + | - | - | - | - | - |

Up= unpalatable spp. P= palatable spp. * Frut - absent + present

Table (6): Effect of location and growing seasons on plant density (plant/m²) and coverage (%) of perennial native plants grown under El-Sheikh Zuwied district during 2002-2003 annuals (mean of two seasons)

| Scientific name | Plant density | | | | | | | | | | | | |
|--------------------------------|---------------|------|------|------|------|--------|------|------|------|------|------|------|------|
| | Spring | | | | | Autumn | | | | | | | |
| | S1 | S2 | S3 | S4 | S5 | M | S1 | S2 | S3 | S4 | S5 | M | |
| <i>Ruppia maritima</i> | - | 0.6 | - | - | - | 0.12 | - | - | - | - | - | - | - |
| <i>Cardaria draba</i> | - | - | 0.4 | 0.6 | 1.0 | 0.40 | - | - | - | - | - | - | - |
| <i>Thymelaea hirsuta</i> | - | - | - | - | 0.1 | 0.02 | - | - | - | - | - | 0.1 | 0.02 |
| <i>Tamarix aphylla</i> | - | 0.1 | 0.1 | 0.2 | 0.1 | 0.10 | - | - | 0.4 | - | - | 0.4 | 0.16 |
| <i>Solanum elaeagnifolium</i> | - | - | - | - | - | - | - | 0.2 | - | - | - | 0.1 | 0.06 |
| <i>Lycium europaeum</i> | - | 0.1 | - | - | - | 0.02 | - | - | - | - | - | - | - |
| <i>Calligonum comosum</i> | - | 0.1 | - | - | 1.1 | 0.24 | - | - | - | - | - | - | - |
| <i>Frankenia revoluta</i> | - | - | - | - | - | - | - | - | - | - | - | - | - |
| <i>Silene succulenta</i> | - | 0.1 | 0.2 | 0.38 | - | 0.14 | 0.2 | - | - | 1.0 | - | 0.2 | 0.24 |
| <i>Achillea fragrantissima</i> | - | - | - | - | - | - | - | 2.0 | - | 0.1 | - | 0.2 | 0.06 |
| <i>Artemisia monosperma</i> | 0.6 | 0.7 | 0.7 | 0.4 | 0.3 | 0.54 | 1.7 | 0.4 | 0.7 | 0.4 | - | 0.6 | 0.76 |
| <i>Atractyles carduus</i> | 0.1 | 0.1 | 0.1 | 0.4 | 1.8 | 0.50 | - | - | - | - | - | - | - |
| <i>Spharanthus abyssinicus</i> | - | - | 0.3 | 0.2 | - | 0.10 | - | - | - | - | - | - | - |
| Mean | 0.05 | 0.14 | 0.14 | 0.17 | 0.34 | 0.17 | 0.15 | 0.20 | 0.08 | 0.12 | 0.11 | 0.13 | - |
| L.S.D. (5%) | 0.07 | 0.12 | 0.10 | 0.11 | 0.48 | - | 0.07 | 0.47 | 0.08 | 0.10 | 0.10 | 0.10 | - |

Table (6) con.

| Scientific name | Coverage (%) | | | | | | | | | | | | |
|--------------------------------|--------------|------|-------|-------|-------|--------|-------|------|------|-------|-------|-------|------|
| | Spring | | | | | Autumn | | | | | | | |
| | S1 | S2 | S3 | S4 | S5 | M | S1 | S2 | S3 | S4 | S5 | M | |
| <i>Ruppia maritima</i> | - | 1.2 | - | 8.29 | 0.15 | 0.24 | - | - | - | - | - | - | - |
| <i>Cardaria draba</i> | - | - | 0.15 | - | 10.0 | 1.32 | - | - | - | - | - | - | - |
| <i>Thymelaea hirsuta</i> | - | 6.00 | 4.17 | 17.20 | 10.0 | 7.87 | - | - | 20.2 | - | 20.0 | 4.00 | 9.00 |
| <i>Tamarix aphylla</i> | - | - | - | - | - | - | - | 4.60 | - | - | 24.8 | 9.00 | 1.16 |
| <i>Solanum elaeagnifolium</i> | - | 3.60 | - | - | - | 0.72 | - | - | - | - | 1.20 | - | - |
| <i>Lycium europaeum</i> | - | 1.20 | - | - | 5.30 | 1.30 | - | - | - | - | - | - | - |
| <i>Calligonum comosum</i> | - | - | - | - | - | - | 0.60 | - | - | 4.80 | - | - | 1.08 |
| <i>Frankenia revoluta</i> | - | 0.30 | 2.80 | 12.53 | - | 3.13 | - | - | - | 4.20 | - | - | 1.34 |
| <i>Silene succulenta</i> | - | - | - | - | - | 0.00 | - | 10.0 | - | - | 2.50 | - | 2.00 |
| <i>Achillea fragrantissima</i> | - | - | 24.80 | 1.60 | 6.98 | 11.59 | 43.80 | 1.46 | 16.1 | 10.50 | 14.50 | 17.27 | - |
| <i>Artemisia monosperma</i> | 9.16 | 15.4 | 1.93 | 1.66 | 1.62 | 2.08 | - | - | - | - | - | - | - |
| <i>Atractyles carduus</i> | 2.90 | 2.30 | 1.00 | 0.40 | 0.28 | 0.28 | - | - | - | - | - | - | - |
| <i>Spharanthus abyssinicus</i> | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Mean | 0.93 | 2.46 | 2.68 | 3.05 | 2.62 | 2.35 | 3.42 | 1.24 | 2.86 | 2.71 | 5.73 | 2.76 | - |
| L.S.D. (5%) | 0.81 | 1.04 | 0.97 | 1.04 | 1.041 | 0.47 | 3.42 | 1.24 | 2.79 | 1.50 | 4.85 | - | - |

Table (7): Effect of location and growing seasons on plant density (plant/m²) and coverage (%) of annual native plants grown under El-Sheikh Zuwied district during 2002–2003 annuals (mean of two seasons)

| Scientific name | Plant density | | | | | | | | | | | |
|------------------------------------|---------------|------|------|------|------|--------|-------|------|------|-------|----|------|
| | Spring | | | | | Autumn | | | | | | |
| | S1 | S2 | S3 | S4 | S5 | M | S1 | S2 | S3 | S4 | S5 | M |
| <i>Chenopodium murale</i> | 0.4 | 0.2 | 0.2 | - | - | 0.16 | 0.15 | - | - | - | - | 0.03 |
| <i>Salsola kali</i> | - | - | - | - | - | - | 0.20 | - | - | 0.10 | - | 0.06 |
| <i>Convolvulus siculu</i> | 0.9 | - | - | - | 0.3 | 0.24 | - | 0.20 | - | - | - | 0.04 |
| <i>Malva parviflora</i> | 0.2 | - | - | - | - | 0.04 | - | - | - | - | - | - |
| <i>Spergula fallax</i> | - | - | 0.3 | - | - | 0.06 | - | - | - | - | - | - |
| <i>Mesembryanthemum nodiflorum</i> | 1.0 | 0.5 | - | 0.8 | 0.5 | 0.70 | - | - | - | - | - | - |
| <i>Chrysanthemum coronarium</i> | - | 0.1 | - | - | 0.3 | 0.08 | 10.00 | - | - | 10.00 | - | 4.00 |
| <i>Avena sativa</i> | - | 0.1 | 4.4 | 0.7 | - | 1.04 | - | - | 1.00 | 0.40 | - | 0.28 |
| <i>Hordeum leporinum</i> | 0.3 | 3.0 | 0.5 | - | - | 0.76 | - | - | - | - | - | - |
| <i>Schismus barbatus</i> | - | - | - | - | 0.4 | 0.08 | - | - | - | - | - | - |
| Mean | 0.28 | 0.39 | 0.60 | 0.15 | 0.15 | 0.32 | 1.04 | 0.02 | 0.10 | 1.05 | - | 0.44 |
| L.S.D. (5%) | 0.55 | 0.55 | 0.55 | 0.08 | 0.11 | - | 0.54 | 0.05 | 0.54 | 0.54 | - | - |

Table (7) con.

| Scientific name | Coverage (%) | | | | | | | | | | | |
|------------------------------------|--------------|------|-------|------|------|--------|------|------|------|------|----|------|
| | Spring | | | | | Autumn | | | | | | |
| | S1 | S2 | S3 | S4 | S5 | M | S1 | S2 | S3 | S4 | S5 | M |
| <i>Chenopodium murale</i> | 2.40 | 0.90 | 0.40 | - | - | 0.74 | 3.20 | - | - | - | - | 0.64 |
| <i>Salsola kali</i> | - | - | - | - | - | - | 1.50 | - | - | 0.60 | - | 0.42 |
| <i>Convolvulus siculu</i> | 4.50 | - | - | - | 0.90 | 1.08 | - | 4.30 | - | - | - | 0.86 |
| <i>Malva parviflora</i> | 0.60 | - | - | - | - | 0.12 | - | - | - | - | - | - |
| <i>Spergula fallax</i> | - | - | 0.20 | - | - | 0.04 | - | - | - | - | - | - |
| <i>Mesembryanthemum nodiflorum</i> | 7.13 | 6.90 | - | 1.70 | 3.40 | 3.83 | - | - | - | - | - | - |
| <i>Chrysanthemum coronarium</i> | - | 0.40 | - | 0.60 | 1.20 | 0.32 | 3.60 | - | - | 4.00 | - | 1.52 |
| <i>Avena sativa</i> | - | 2.20 | 11.59 | 0.60 | - | 2.88 | - | - | 13.4 | 7.20 | - | 4.12 |
| <i>Hordeum leporinum</i> | 1.20 | 1.20 | 5.50 | - | - | 1.58 | - | - | - | - | - | - |
| <i>Schismus barbatus</i> | - | - | - | - | 0.60 | 0.12 | - | - | - | - | - | - |
| Mean | 1.58 | 1.16 | 1.77 | 0.23 | 0.61 | 1.07 | 0.83 | 0.43 | 1.34 | 1.18 | - | 0.76 |
| L.S.D. (5%) | 1.08 | 0.93 | 0.77 | 0.08 | 0.77 | - | 1.08 | 0.54 | 0.76 | 0.76 | - | - |

(b) Annual spp.

The density of annual species seemed to be higher under Spring season than the Autumn one. *Avena sativa* seemed to be the main dominant plant during Spring especially under ecosystem of site 3 (inner plateau). In addition, site 3 was more rich in most plant density than any other sites.

Chrysanthemum Coronarium was highest no under sites 1 and 4 during Autumn. *Hordeum leporinum* was found only in inner plateau (S1, S2 and S3) during Spring and completely absent during Autumn.

Obviously, plants, which had high density, did not necessarily have high cover percent. This may be due to short and thin dense perennial or annual species or small new seedlings. On the other hand few huge herbs may occupy a larger space compared with number small annual plants, (Loria and Noy Meir 1979).

Therefore, *Artemisia*, *Tamarix*, *Thymelaea hirsute* and *Avena sativa*, *Chrysanthemum* had the highest perennial and annual plants were recorded in wet and dry seasons, also sites 3 and 4 over the whole sites for cover percentage at perennial plants in wet and sites 1 and 3 in dry seasons. Sites 1 and 3 seemed to have the highest coverage % of annuals either during spring or during autumn seasons than any other sites. Annual rainfall gradients and differences in soil characters may be associated with such plant composition diversity as found by Abu- Irmaileh (1994). Also, Abou-Deya, (1996) found that density of native plants fluctuated from seasons to other ones.

Frequency and abundance percentages in perennial and annual (Tables 8&9)

1- Frequency (%)

a) Perennial spp

The highest frequency (%) was gained by *Artemisia monosperma* sp. Especially during Autumn followed by *Tamarix aphylla* one. Also the frequency between different sites was greatly varied. During Spring, the frequency seemed to be slight higher than Autumn one.

b) Annual spp.

The same conclusion was get in annual plants as discussed before in the case of perennials. It may be concluded also that *Avena sativa* showed the highest frequency % during both seasons. *Mesembryanthemum nodiflorum* showed also the highest frequency % during Spring only, as it was completely absent during Autumn (Short lived plant).

2- Abundance (%)

All the above mentioned results were true of the abundance % as it was discussed in frequency %.

Fresh and dry weights (yield of different plant spp.) Tables 10&11

a) Perennial plant yields of different plants

Great variations in plant species yield (fresh and dry) were obtained in these respects, as different sites and seasons factors must play an important role. The different vegetation analysis must interpret in these respects.

Table (8): Effect of location and growing seasons on the frequency and abundance (%) of perennial native plants grown under El-Sheikh Zuwied district during 2002– 2003 annuals (means of two seasons)

| Scientific name | Spring | | | | | Autumn | | | | | | |
|---------------------------------|--------|------|------|-------|------|--------|------|------|------|------|------|-------|
| | S1 | S2 | S3 | S4 | S5 | M | S1 | S2 | S3 | S4 | S5 | M |
| <i>Ruppia maritima</i> | - | 10 | - | - | - | 2 | - | - | - | - | - | - |
| <i>Cerdaria draba</i> | - | - | 10 | 30 | 10 | 10 | - | - | - | - | - | - |
| <i>Thymelaea hirsuta</i> | - | - | - | - | 10 | 2 | - | - | - | - | 20 | 4.00 |
| <i>Tamarix aphylla</i> | - | 10 | 10 | 20 | 10 | 10 | - | - | 20 | - | 30 | 10.00 |
| <i>Lycium europaeum</i> | - | 10 | - | - | - | 2 | - | - | - | - | - | - |
| <i>Solanum elaeagnifolium</i> | - | - | - | - | - | - | - | 20 | - | - | 10 | 6.00 |
| <i>Calligonum comosum</i> | - | 10 | - | - | - | 6 | - | - | - | - | - | - |
| <i>Frankenia revoluta</i> | - | 10 | - | - | - | - | 20 | - | - | 10 | - | 6.00 |
| <i>Silene succulenta</i> | - | 10 | 20 | 40 | - | 14 | - | - | - | 10 | 20 | 6.00 |
| <i>Achillea fragrantissima</i> | - | - | - | - | - | - | - | 10 | - | - | - | 2.00 |
| <i>Artemisia monsperma</i> | 40 | 30 | 40 | 30 | 30 | 34 | 80 | 20 | 30 | - | 50 | 44.00 |
| <i>Atractylis carduus</i> | 10 | 10 | 10 | 20 | 30 | 18 | - | - | - | - | - | - |
| <i>Sphaeranthus abyssinicus</i> | - | - | 20 | 10 | - | 6 | - | - | - | 40 | - | - |
| Mean | 3.85 | 6.92 | 9.17 | 11.54 | 8.46 | 7.88 | 7.69 | 3.85 | 3.85 | 4.62 | 10.0 | 6.00 |
| L.S.D. (5%) | 0.15 | 0.54 | 0.54 | 0.46 | 0.46 | - | 0.23 | 0.31 | 0.23 | 0.23 | 0.31 | - |

Table (8) con. Abundance (%)

| Scientific name | Spring | | | | | Autumn | | | | | | |
|---------------------------------|--------|-------|------|-------|-------|--------|--------|-------|-------|-------|------|-------|
| | S1 | S2 | S3 | S4 | S5 | M | S1 | S2 | S3 | S4 | S5 | M |
| <i>Ruppia maritima</i> | - | 5.31 | - | - | - | 1.06 | - | - | - | - | - | - |
| <i>Cerdaria draba</i> | - | - | 9.09 | 5.56 | 13.16 | 5.56 | - | - | - | - | - | - |
| <i>Thymelaea hirsuta</i> | - | - | - | - | 2.38 | 0.48 | - | - | - | - | 12.5 | 2.50 |
| <i>Tamarix aphylla</i> | - | 10.00 | 1.00 | 4.76 | 2.38 | 3.63 | - | - | 16.95 | - | 25.0 | 8.39 |
| <i>Lycium europaeum</i> | - | - | - | - | - | - | - | 7.14 | - | - | 6.25 | 2.68 |
| <i>Solanum elaeagnifolium</i> | - | 10.00 | - | - | - | 2.00 | - | - | - | - | - | - |
| <i>Calligonum comosum</i> | - | 1.07 | - | - | 14.45 | 3.10 | - | - | - | 62.50 | - | - |
| <i>Frankenia revoluta</i> | - | 1.07 | - | - | - | - | -11.11 | - | - | 7.14 | 7.14 | 14.72 |
| <i>Silene succulenta</i> | - | - | 4.55 | 47.87 | - | 10.70 | - | - | - | - | - | - |
| <i>Achillea fragrantissima</i> | - | - | - | - | - | - | 64.68 | 71.43 | - | - | - | 2.86 |
| <i>Artemisia monsperma</i> | 15.50 | 12.13 | 9.55 | 9.53 | 5.01 | 10.34 | - | 14.29 | 20.55 | 21.88 | 37.5 | 14.29 |
| <i>Atractylis carduus</i> | 3.34 | 10.00 | 1.00 | 3.71 | 38.6 | 11.33 | - | - | - | - | - | 31.78 |
| <i>Sphaeranthus abyssinicus</i> | - | - | 8.82 | 4.76 | - | 2.32 | - | - | - | - | - | - |
| Mean | 1.45 | 3.81 | 2.46 | 5.86 | 5.84 | 3.89 | 5.83 | 7.14 | 2.88 | 7.04 | 6.80 | 5.94 |
| L.S.D. (5%) | 0.66 | 1.23 | 1.14 | 1.14 | 1.14 | - | 0.81 | 0.93 | 0.66 | 0.81 | 0.93 | - |

Table (9) : Effect of location and growing seasons on the frequency and abundance (%) of annual native plants grown under El-Sheikh Zuwied district during 2002– 2003 annuals (means of two seasons)

| Scientific name | Frequency (%) | | | | | | | | | | | |
|------------------------------------|---------------|-----|------|-----|------|--------|------|----|------|------|----|----|
| | Spring | | | | | Autumn | | | | | | |
| | S1 | S2 | S3 | S4 | S5 | M | S1 | S2 | S3 | S4 | S5 | M |
| <i>Chenopodium murale</i> | 10 | 10 | 10 | - | - | 6 | 20 | - | - | - | - | 4 |
| <i>Salsola kali</i> | - | - | - | - | - | - | 10 | - | - | - | 10 | 4 |
| <i>Convolvulus siculu</i> | 30 | - | - | - | 10 | 8 | - | 10 | - | - | - | 2 |
| <i>Malva parviflora</i> | 10 | - | - | - | - | 2 | - | - | - | - | - | - |
| <i>Spergula fallax</i> | - | - | 10 | - | - | 2 | - | - | - | - | - | - |
| <i>Mesembryanthemum nodiflorum</i> | 20 | 20 | - | 20 | 20 | 16 | - | - | - | - | - | - |
| <i>Chrysanthemum coronarium</i> | - | 10 | - | - | 10 | 4 | 10 | - | - | 10 | - | 4 |
| <i>Avena sativa</i> | - | 10 | 30 | 10 | - | 10 | - | - | 50 | 30 | - | 16 |
| <i>Hordeum leporinum</i> | 10 | 10 | 10 | - | - | 6 | - | - | - | - | - | - |
| <i>Schismus barbatus</i> | - | - | - | - | 10 | 2 | - | - | - | - | - | - |
| Mean | 8 | 6 | 6 | 3 | 5 | 5.6 | 4 | 1 | 5 | 5 | - | 3 |
| L.S.D. (5%) | 1.2 | 1.2 | 1.08 | 5.4 | 1.08 | - | 0.76 | - | 0.76 | 1.08 | - | - |

Table (9) con.

| Scientific name | Abundance (%) | | | | | | | | | | | |
|------------------------------------|---------------|-------|-------|-------|-------|--------|------|------|-------|-------|----|-------|
| | Spring | | | | | Autumn | | | | | | |
| | S1 | S2 | S3 | S4 | S5 | M | S1 | S2 | S3 | S4 | S5 | M |
| <i>Chenopodium murale</i> | 4.26 | 2.13 | 4.55 | - | - | 2.19 | 9.92 | - | - | - | - | 1.98 |
| <i>Salsola kali</i> | - | - | - | - | - | - | 2.45 | - | - | - | - | 1.11 |
| <i>Convolvulus siculu</i> | 9.58 | - | - | - | 3.95 | 2.71 | - | 5.55 | - | 3.12 | - | 1.11 |
| <i>Malva parviflora</i> | 2.11 | - | - | - | - | 0.42 | - | - | - | - | - | - |
| <i>Spergula fallax</i> | - | - | 6.82 | - | - | 1.36 | - | - | - | - | - | - |
| <i>Mesembryanthemum nodiflorum</i> | 33.33 | 5.32 | - | 19.05 | 10.84 | 13.71 | - | - | - | - | - | - |
| <i>Chrysanthemum coronarium</i> | - | 1.07 | - | - | 3.95 | 1.00 | 2.78 | - | - | 3.13 | - | 1.18 |
| <i>Avena sativa</i> | - | 10.00 | 45.28 | 4.76 | - | 12.01 | - | - | 43.75 | 18.75 | - | 12.50 |
| <i>Hordeum leporinum</i> | 31.92 | 31.9 | 11.37 | - | - | 15.04 | - | - | - | - | - | - |
| <i>Schismus barbatus</i> | - | - | - | - | 5.27 | 1.05 | - | - | - | - | - | - |
| Mean | 8.12 | 5.04 | 6.80 | 2.38 | 2.40 | 4.95 | 1.52 | 0.56 | 4.38 | 2.50 | - | 1.79 |
| L.S.D. (5%) | 1.20 | 1.20 | 5.99 | 0.78 | 1.08 | - | 0.93 | - | 0.76 | 1.20 | - | - |

Table (10): Effect of location and growing seasons on the fresh and dry productivity (Ton/fed.) of perennial native plants grown under El-Sheikh Zuwied district during 2002– 2003 annuals (means of two seasons)

| Scientific name | Spring | | | | | Autumn | | | | | | | |
|--------------------------------|--------|-------|-------|-------|-------|--------|-------|-------|-------|-------|-------|------|------|
| | S1 | S2 | S3 | S4 | S5 | M | S1 | S2 | S3 | S4 | S5 | M | |
| <i>Ruppia maritima</i> | - | 0.013 | - | 0.004 | 0.075 | 0.03 | - | - | - | - | - | - | - |
| <i>Cardaria draba</i> | - | - | 0.004 | - | 0.007 | 0.02 | - | - | - | - | - | - | 0.21 |
| <i>Thymelaea hirsuta</i> | - | - | - | - | 0.755 | 0.15 | - | - | - | - | 1.050 | - | 0.38 |
| <i>Tamarix aphylla</i> | - | 0.130 | 0.378 | 0.756 | 0.336 | 0.32 | - | - | 0.798 | - | 1.113 | - | 0.02 |
| <i>Solanum elaeagnifolium</i> | - | - | - | - | - | - | - | - | - | - | 0.025 | - | - |
| <i>Lycium europaeum</i> | - | 0.015 | - | - | - | 0.03 | - | 0.080 | - | - | - | - | - |
| <i>Calligonum comosum</i> | - | 0.013 | - | - | 0.097 | 0.02 | - | - | - | - | - | - | 0.01 |
| <i>Frankenia revoluta</i> | - | - | - | - | - | - | - | - | - | - | - | - | 0.04 |
| <i>Silene succulenta</i> | - | 0.007 | 0.176 | 0.385 | - | 0.11 | 0.030 | - | - | 0.084 | 0.109 | - | 0.07 |
| <i>Achillea fragrantissima</i> | - | - | - | - | - | - | - | 0.336 | - | - | - | - | 0.91 |
| <i>Artemisia monosperma</i> | 0.216 | 0.220 | 0.600 | 0.051 | 0.263 | 0.27 | 1.718 | 0.800 | 0.924 | 0.395 | 0.714 | - | - |
| <i>Atractyles carduus</i> | 0.010 | 0.015 | 0.093 | 0.021 | 0.083 | 0.05 | - | - | - | - | - | - | - |
| <i>Spharanthus abyssinicus</i> | - | - | 0.021 | 0.009 | 0.01 | 0.01 | - | - | - | - | - | - | - |
| Mean | 0.020 | 0.030 | 0.100 | 0.100 | 0.120 | 0.08 | 0.13 | 0.090 | 0.130 | 0.040 | 0.230 | 0.13 | - |
| L.S.D. (5%) | 0.005 | 0.007 | 0.047 | 0.465 | 0.005 | - | .001 | 0.047 | 0.001 | 0.007 | 0.658 | - | - |

Table (10) con.

| Scientific name | Spring | | | | | Autumn | | | | | | | |
|--------------------------------|--------|-------|-------|-------|-------|--------|-------|-------|-------|-------|-------|------|------|
| | S1 | S2 | S3 | S4 | S5 | M | S1 | S2 | S3 | S4 | S5 | M | |
| <i>Ruppia maritima</i> | - | 0.003 | - | 0.024 | - | 0.01 | - | - | - | - | - | - | - |
| <i>Cardaria draba</i> | - | - | 0.002 | - | 0.002 | 0.01 | - | - | - | - | - | - | 0.16 |
| <i>Thymelaea hirsuta</i> | - | - | - | - | 0.685 | 0.14 | - | - | - | - | 0.799 | - | 0.19 |
| <i>Tamarix aphylla</i> | - | 0.044 | 0.205 | .265 | 0.180 | 0.14 | - | - | 0.376 | - | 0.560 | - | 0.01 |
| <i>Solanum elaeagnifolium</i> | - | - | - | - | - | - | - | 0.028 | - | - | 0.010 | - | - |
| <i>Lycium ewopaeum</i> | - | 0.005 | - | - | - | 0.01 | - | - | - | - | - | - | - |
| <i>Calligonum comosum</i> | - | 0.007 | - | - | 0.030 | 0.01 | 0.020 | - | - | 0.010 | - | - | 0.01 |
| <i>Frankenia revoluta</i> | - | - | - | - | - | - | - | - | - | 0.750 | 0.460 | - | 0.24 |
| <i>Silene succulenta</i> | - | 0.004 | 0.047 | .125 | - | 0.04 | - | - | - | - | - | - | 0.02 |
| <i>Achillea fragrantissima</i> | - | - | - | - | - | - | - | 0.115 | - | - | - | - | 0.44 |
| <i>Artemisia monosperma</i> | 0.052 | 0.072 | 0.150 | .017 | 0.132 | 0.08 | 1.143 | 0.032 | 0.440 | 0.253 | 0.336 | - | - |
| <i>Atractyles carduus</i> | 0.005 | 0.002 | 0.019 | .006 | 0.059 | 0.02 | - | - | - | - | - | - | - |
| <i>Spharanthus abyssinicus</i> | - | - | 0.007 | .004 | - | 0.01 | - | - | - | - | - | - | - |
| Mean | 0.010 | 0.010 | 0.030 | 0.04 | 0.080 | 0.03 | 0.090 | 0.010 | 0.060 | 0.080 | 0.170 | 0.08 | - |
| L.S.D. (5%) | 0.001 | 0.001 | 0.007 | .001 | 0.047 | - | 0.466 | 0.001 | 0.005 | 0.005 | 0.047 | - | - |

Table (11): Effect of location and growing seasons on the fresh and dry productivity (Tonfed.) of annual native plants grown under El-Sheikh Zuweid district during 2002-2003 annuals (means of two seasons)

| Scientific name | Spring | | | | | Autumn | | | | | | |
|------------------------------------|--------|-------|-------|-------|-------|--------|-------|-------|-------|-------|----|-------|
| | S1 | S2 | S3 | S4 | S5 | M | S1 | S2 | S3 | S4 | S5 | M |
| <i>Chenopodium murale</i> | 0.042 | 0.017 | 0.017 | - | - | 0.015 | 0.139 | - | - | - | - | 0.028 |
| <i>Salsola kali</i> | - | - | - | - | - | - | 0.084 | - | - | 0.084 | - | 0.034 |
| <i>Convolvulus siculu</i> | 0.093 | - | - | - | 0.093 | 0.037 | - | - | - | - | - | 0.003 |
| <i>Malva parviflora</i> | 0.008 | - | - | - | - | 0.002 | - | 0.013 | - | - | - | - |
| <i>Spergula fallax</i> | - | - | 0.009 | - | - | 0.002 | - | - | - | - | - | - |
| <i>Mesembryanthemum nodiflorum</i> | 0.170 | 0.093 | - | 0.038 | 0.093 | 0.079 | - | - | - | - | - | - |
| <i>Chrysanthemum coronarium</i> | - | 0.009 | - | - | 0.009 | 0.004 | 0.011 | - | - | 0.034 | - | 0.009 |
| <i>Avena sativa</i> | - | 0.010 | 0.077 | 0.009 | - | 0.019 | - | - | 0.248 | 0.185 | - | 0.087 |
| <i>Hordeum leporinum</i> | 0.009 | 0.009 | 0.009 | - | - | 0.005 | - | - | - | - | - | - |
| <i>Schismus barbatus</i> | - | - | - | - | 0.009 | 0.002 | - | - | - | - | - | - |
| Mean | 0.030 | 0.010 | 0.010 | 0.001 | 0.020 | 0.016 | 0.020 | 0.001 | 0.02 | 0.030 | - | 0.016 |
| L.S.D. (5%) | 0.005 | 0.005 | 0.006 | 0.001 | 0.001 | - | 0.005 | - | 0.001 | 0.001 | - | - |

Table (11) con.

| Scientific name | Spring | | | | | Autumn | | | | | | |
|------------------------------------|--------|-------|-------|-------|-------|--------|-------|-------|-------|-------|----|-------|
| | S1 | S2 | S3 | S4 | S5 | M | S1 | S2 | S3 | S4 | S5 | M |
| <i>Chenopodium murale</i> | 0.006 | 0.003 | 0.003 | - | - | 0.002 | 0.055 | - | - | - | - | 0.011 |
| <i>Salsola kali</i> | - | - | - | - | - | - | 0.055 | - | - | 0.005 | - | 0.012 |
| <i>Convolvulus siculu</i> | 0.016 | - | - | - | 0.003 | 0.004 | - | - | - | - | - | 0.001 |
| <i>Malva parviflora</i> | 0.001 | - | - | - | - | 0.001 | - | 0.005 | - | - | - | - |
| <i>Spergula fallax</i> | - | - | 0.001 | - | - | 0.001 | - | - | - | - | - | - |
| <i>Mesembryanthemum nodiflorum</i> | 0.030 | 0.021 | - | 0.009 | 0.024 | 0.017 | - | - | - | - | - | - |
| <i>Chrysanthemum coronarium</i> | - | 0.015 | - | - | 0.020 | 0.007 | 0.023 | - | - | .011 | - | 0.007 |
| <i>Avena sativa</i> | - | 0.005 | 0.033 | 0.004 | - | 0.008 | - | - | 0.182 | 0.128 | - | 0.062 |
| <i>Hordeum leporinum</i> | 0.002 | 0.002 | 0.002 | - | - | 0.001 | - | - | - | - | - | - |
| <i>Schismus barbatus</i> | - | - | - | - | 0.002 | 0.000 | - | - | - | - | - | - |
| Mean | 0.006 | 0.005 | 0.004 | 0.001 | 0.005 | 0.004 | 0.013 | 0.001 | 0.018 | 0.014 | - | 0.009 |
| L.S.D. (5%) | 0.005 | 0.001 | 0.006 | 0.001 | 0.001 | - | 0.006 | - | 0.005 | 0.001 | - | - |

The highest yield of fresh and dry seasons may be get under the ecosystem of site 3, 4 and 5 during Spring of perennials.

However during Autumn the highest yield of perennials was get under site 5 followed by sites one and three while the others were less. The highest yield of plant species yields was get by *Tamarix aphylla* during Spring while during Autumn the highest yield was get by *Artemisia monsperma*.

b) Annual plant yield.

Most species showed low amount of yield comparing to perennial ones.

The yields may be related to the dominated species which varied from one site to another, annual rainfall gradients and differences in soil character may be associated with such plants composition, diversity, as found by Abu- Irmaileh (1994) and steenekamp and Boscb (1995). Additional, favorable environmental conditions at El-Shake Zuwied area, respecting the larger amounts of winter rainfall, higher relative humidity during the dry months.

The above mentioned results may be discussed on the basis found by Sheng et al, (1994) where soil pH, structure and soil humidity were the main acting factors controlling the pattern and distribution of plant community. Similar results were found by El-demerdash et al (1995).

Simple correlation Coefficient (r) analysis between some factors interrelationships

We considered the significant correlation coefficient (r) are those of 0.6 and over this number.

(1)- Simple correlation (r) between some soil chemical properties and specific native vegetation analysis parameters under the variable condition of El-Sheikh Zuwied district during two seasons are calculated.

a- Perennial native plants (Table 12)

* In Spring

- The positive relationship are six correlations
- The negative relationship are six correlations

The highest correlations of soil chemical properties was found with frequency % (4signficants) these were greatly varied according to the tested chemical properties and calculated vegetation analysis.

* In Autumn

- The positive relationship are 14 correlations
- The negative relationship are 8 correlations

The highest correlations of soil chemical properties was found with density (plant/m²) (5signficants) these were greatly varied according to the tested chemical properties and calculated vegetation analysis.

b- Annual native plants (Table 13)

* In Spring

- The positive relationship are 11 correlations
- The negative relationship are 4 correlations

The highest correlations of soil chemical properties was found with fresh productivity (Ton/fed) (5 significant) these were greatly varied according to the tested chemical properties and calculated vegetation analysis.

* In Autumn

- The positive relationship are 8 correlations

- The negative relationship are 15 correlations

The highest correlations of soil chemical properties was found with abundance % (6 significant) these were greatly varied according to the tested chemical properties and calculated vegetation analysis.

This means the correlations between some soil chemical properties with relation to vegetation analysis was differed during the tested seasons, i.e the prevailing meteorological data.

Table (12) Simple correlation coefficient (r) between some soil chemical characteristics and some specific native vegetation analysis parameters of perennial plants under El-Sheikh Zuwied district during 2002-2003 annuals

| Season | Soil chemical characteristics | Density (plant/m ²) | Coverage %X | Frequency (%) | Abundance %K | Fresh productivity (Ton/fed) | Dry productivity (Ton/fed) |
|--------|-------------------------------|---------------------------------|---------------|---------------|---------------|------------------------------|----------------------------|
| Spring | PH | -0.448 | <u>-0.709</u> | -0.430 | -0.525 | -0.197 | -0.157 |
| | EC (m. Mhos/cm) | 0.038 | <u>-0.749</u> | <u>-0.825</u> | -0.239 | -0.480 | 0.010 |
| | SO4-- | <u>0.601</u> | -0.240 | -0.362 | 0.316 | 0.043 | 0.544 |
| | CO3-- | -0.147 | 0.226 | 0.232 | -0.402 | 0.319 | -0.078 |
| | HCO3- | 0.033 | 0.579 | <u>0.775</u> | -0.169 | -0.598 | -0.132 |
| | CL- | <u>0.903</u> | 0.210 | 0.131 | 0.510 | <u>0.632</u> | <u>0.913</u> |
| | K+ | -0.143 | 0.201 | -0.080 | 0.489 | -0.451 | -0.459 |
| | Na+ | -0.108 | 0.579 | <u>0.782</u> | 0.198 | 0.509 | 0.041 |
| | Mg++ | 0.396 | <u>-0.738</u> | <u>-0.851</u> | -0.395 | <u>-0.883</u> | -0.524 |
| | Ca++ | 0.866 | -0.560 | -0.526 | -0.534 | <u>0.915</u> | -0.914 |
| Autumn | PH | 0.313 | 0.327 | 0.374 | -0.020 | 0.083 | 0.342 |
| | EC (m. Mhos/cm) | 0.442 | 0.412 | <u>0.740</u> | -0.188 | 0.576 | 0.381 |
| | SO4-- | 0.207 | <u>0.698</u> | <u>0.891</u> | -0.503 | <u>0.754</u> | <u>0.688</u> |
| | CO3-- | <u>-0.638</u> | -0.114 | 0.439 | -0.317 | <u>0.048</u> | -0.212 |
| | HCO3- | <u>0.719</u> | 0.113 | 0.493 | -0.512 | 0.424 | 0.074 |
| | CL- | -0.388 | <u>0.895</u> | <u>0.792</u> | <u>-0.891</u> | <u>0.874</u> | <u>0.862</u> |
| | K+ | <u>0.749</u> | <u>-0.726</u> | 0.558 | 0.469 | -0.451 | <u>-0.752</u> |
| | Na+ | -0.595 | -0.230 | -0.568 | 0.404 | 0.509 | -0.171 |
| | Mg++ | <u>0.862</u> | -0.225 | 0.211 | <u>0.894</u> | <u>-0.883</u> | -0.235 |
| | Ca++ | <u>0.729</u> | -0.732 | -0.417 | 0.176 | -0.915 | -0.694 |

(2)- Simple correlation (r) between plant density (plant/m²) and some another specific native vegetation analysis parameters under the variable condition of El-Sheikh Zuwied district during two seasons are calculated.

a- Perennial native plants (Table 14)

* In Spring

S1: All of the tested parameters significant.

- S2:** Four positive significant correlations except (1) plant density (plant/m²) and abundance %.
- S3:** Four positive significant correlations except (1) plant density (plant/m²) and dry productivity Ton/fed.
- S4:** One positive significant correlations plant density (plant/m²) and frequency % while the other are not significant.
- S5:** One positive significant correlations plant density (plant/m²) and abundance % while the other are not significant.

Table (13) Simple correlation coefficient (r) between some soil chemical characteristics and some specific native vegetation analysis parameters of annual plants under El-Sheikh Zuwied district during 2002-2003 annuals

| Season | Soil chemical characteristics | Density (plant/m ²) | Coverage % | Frequency (%) | Abundance % | Fresh productivity (Ton/fed) | Dry productivity (Ton/fed) |
|------------------|-------------------------------|---------------------------------|------------|---------------|-------------|------------------------------|----------------------------|
| Spring | PH | -0.121 | 0.311 | 0.449 | 0.526 | 0.614 | 0.185 |
| | EC (m. Mhos/cm) | -0.364 | 0.153 | 0.635 | 0.239 | 0.892 | 0.815 |
| | SO ₄ -- | -0.619 | -0.292 | 0.148 | -0.317 | 0.598 | 0.530 |
| | CO ₃ -- | 0.847 | 0.605 | 0.123 | 0.402 | -0.212 | -0.058 |
| | HCO ₃ - | -0.240 | 0.133 | 0.572 | 0.168 | 0.674 | 0.801 |
| | CL- | -0.400 | -0.333 | -0.177 | -0.510 | 0.279 | 0.217 |
| | K+ | 0.311 | 0.077 | 0.035 | -0.007 | -0.348 | 0.120 |
| | Na+ | 0.179 | -0.205 | -0.618 | -0.197 | -0.740 | -0.871 |
| | Mg ⁺⁺ | -0.161 | 0.236 | 0.646 | 0.395 | 0.602 | 0.676 |
| Ca ⁺⁺ | 0.098 | 0.284 | 0.422 | 0.534 | 0.121 | 0.142 | |
| Autumn | PH | 0.704 | 0.351 | 0.535 | 0.560 | 0.571 | 0.590 |
| | EC (m. Mhos/cm) | 0.006 | -0.714 | -0.589 | -0.755 | -0.537 | -0.545 |
| | SO ₄ -- | -0.241 | -0.932 | -0.830 | -0.881 | -0.699 | -0.788 |
| | CO ₃ -- | -0.347 | 0.595 | 0.477 | 0.835 | 0.246 | 0.602 |
| | HCO ₃ - | -0.217 | -0.800 | -0.756 | -0.849 | -0.741 | -0.750 |
| | CL- | -0.472 | -0.690 | -0.642 | -0.465 | -0.552 | -0.537 |
| | K+ | -0.461 | -0.222 | -0.392 | 0.267 | 0.493 | -0.486 |
| | Na+ | 0.311 | 0.823 | 0.779 | 0.812 | 0.787 | 0.739 |
| | Mg ⁺⁺ | 0.131 | -0.485 | -0.408 | -0.645 | -0.402 | -0.455 |
| Ca ⁺⁺ | 0.523 | 0.268 | 0.287 | -0.023 | 0.260 | 0.173 | |

*** In Autumn**

- S1:** All of the tested parameters significant.
- S2:** Two positive significant correlations plant density (plant/m²) and (coverage % and abundance %) while the other are not significant.
- S3:** All of the tested parameters significant.
- S4:** Two positive significant correlations plant density (plant/m²) and (coverage % and abundance %) while the other are not significant.
- S5:** All of the tested parameters significant.

a- Annual native plants (Table 15)

*** In Spring**

- S1:** Four positive significant correlations except (1) plant density (plant/m²) and frequency %.

Table (14): Simple correlation coefficient (r) between plant density (plant/m²) and some another specific native vegetation analysis parameters of perennial plants under the different sites of El-Sheikh Zuwied district during 2002-2003 annuals

| Vegetation analysis | Spring | | | | | Autumn | | | | |
|-----------------------------|--------|-------|-------|-------|--------|--------|-------|-------|-------|-------|
| | S1 | S2 | S3 | S4 | S5 | S1 | S2 | S3 | S4 | S5 |
| Coverage % | 0.989 | 0.684 | 0.807 | 0.471 | 0.053 | 0.995 | 0.937 | 0.919 | 0.651 | 0.724 |
| Frequency % | 0.968 | 0.781 | 0.897 | 0.915 | 0.178 | 0.991 | 0.431 | 0.997 | 0.515 | 0.985 |
| Abundance % | 0.999 | 0.086 | 0.951 | 0.483 | 0.969 | 0.999 | 0.999 | 0.983 | 0.999 | 0.980 |
| Fresh productivity Ton/fed. | 0.993 | 0.660 | 0.696 | 0.274 | -0.036 | 0.995 | 0.496 | 0.978 | 0.363 | 0.704 |
| Dry productivity Ton/fed. | 0.998 | 0.642 | 0.470 | 0.246 | -0.076 | 0.995 | 0.085 | 0.928 | 0.247 | 0.587 |

Table (15): Simple correlation coefficient (r) between plant density (plant/m²) and some another specific native vegetation analysis parameters of annual plants under the different sites of El-Sheikh Zuwied district during 2002-2003 annuals

| Vegetation analysis | Spring | | | | | Autumn | | | | |
|-----------------------------|--------|--------|-------|-------|-------|--------|--------|--------|--------|----|
| | S1 | S2 | S3 | S4 | S5 | S1 | S2 | S3 | S4 | S5 |
| Coverage % | 0.967 | 0.140 | 0.939 | 0.914 | 0.847 | 0.692 | 1.000 | 1.000 | -0.026 | - |
| Frequency % | 0.319 | 0.330 | 0.906 | 0.960 | 0.603 | 0.311 | -0.111 | 1.000 | 0.216 | - |
| Abundance % | 0.674 | 0.957 | 0.981 | 0.870 | 0.956 | 0.158 | -0.169 | -0.111 | -0.078 | - |
| Fresh productivity Ton/fed. | 0.936 | 0.071 | 0.980 | 0.863 | 0.719 | -0.071 | 1.000 | 1.000 | 0.065 | - |
| Dry productivity Ton/fed. | 0.933 | -0.126 | 0.997 | 0.945 | 0.747 | 0.184 | 1.000 | 1.000 | 0.009 | - |

S2: One positive significant correlations plant density (plant/m²) and abundance % while the other are not significant.

S3: All of the tested parameters significant.

S4: All of the tested parameters significant.

S5: All of the tested parameters significant.

*** In Autumn**

S1: One positive significant correlations plant density (plant/m²) and coverage % while the other are not significant.

S2: Three positive significant correlations plant density (plant/m²) and (coverage %, fresh productivity Ton/fed and dry productivity Ton/fed) while the other are not significant.

S3: Four positive significant correlations except (1) plant density (plant/m²) and abundance %.

S4: All of the tested parameters not significant.

The correlation between plant density and another vegetation analysis seemed to differed according to the traveling meteorological factors and the tested different items.

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حصص الكساء الخضري الطبيعي في مواقع مختلفة بمنطقة الشيخ زويد (الساحل الشمالي الشرقي، مصر)

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تتعامل هذه الدراسة مع التنوع الحيوي للنباتات المنتشرة تحت بعض النظم البيئية بمنطقة الشيخ زويد (شمال سيناء). ولقد تم تنفيذ هذه الدراسة خلال حولين ٢٠٠٢، ٢٠٠٣ ومن نتائج الدراسة وجد ٢٣ نوع نباتي في المواقع المختلفة ومنها ١٠ أنواع نباتية حولية، ١٣ نوع نباتي معمر والمجموعة الأخرى تشمل ٦ أنواع شجيرية، ٧ أنواع نباتية عشبية مستديمة.

في المسهل الداخلي بالمواقع ١، ٢، ٣، ٤ وخلال موسم الربيع فإن النباتات المعمرة كانت ٢، ٧، ٧ على الترتيب ولكن في خلال الخريف وجد ٢، ٣، ٢، ٢ أنواع نباتية فقط وفي نفس الوقت وجدت ٤، ٥، ٥، ٤ أنواع نباتية حولية على الترتيب وأيضا ١، ١، ٢، ١ نوع خلال الخريف.

هذا الحصر للكساء الخضري الطبيعي قد يدفع إلى صيانة مناسبة لكل الأنواع النباتية الطبيعية. كما إن المجموعات الشجيرية تؤدي إلى تقليل التنوع الحيوي في هذه المواقع من المنطقة. كما إن الرعي الجائر بالمنطقة يؤدي لنفس التأثير.

هذه الدراسة لم تتطرق فقط لوجود أسلوب مناسب للحفاظ على التنوع الحيوي لكن أيضا إلى زيادة التنوع الحيوي.

ومن الجدير بالذكر أن غياب العديد من الأنواع النباتية في بعض المواقع وخلال الفترات الجافة ربما يكون متعلقا بجمع النباتات الخشبية أو الرعي الجائر للنباتات الحولية.

حيث تم حصر ٦ أنواع معمرة تحت مناطق الكثبان الرملية الساحلية (موقع ٤) وذلك خلال موسم الربيع و ٣ أنواع خلال موسم الخريف ولكن في ظروف المسهل الساحلي (موقع ٥) فإن هناك ٥، ٥، ٥، ٥ أنواع معمرة خلال الربيع والخريف على الترتيب.

بينما تحت ظروف الكثبان الرملية الساحلية تم وجود ٢، ٣، ٣ أنواع حولية خلال الربيع والخريف. بينما كانت هذه الأنواع ٤، ٤، ٢ خلال فصل الربيع والخريف تحت ظروف المسهل الساحلي (موقع ٥).

و من هذا البحث يمكن القول بأن هناك اختلافات كبيرة بين المواقع التي تم دراستها والمواسم التي تمت فيها الدراسة الخاصة بالتنوع الحيوي. كما تم مناقشة تحليل الكساء الخضري ومعامل الارتباط بين بعض العوامل المؤثرة في تحليل الكساء الخضري في هذه الدراسة.