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Ecological Study on Wild Vegetation of Palm Fields across some Oases in Western Desert, Egypt

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ABSTRACT

Vegetation composition and its relation to environmental variables in the palm groves along Kharga, Dakhla and Paris Oases in the Western Desert of Egypt, were examined. The oases are the most prominent features of the Western Desert of Egypt. They are green patches amidst the surrounding sterile desert. The aridity index used by the United Nations Environment Program (UNEP, 1997), indicates that this district lies in a hyper-arid region, with annual rainfall close to 0.0 mm. analysis of vegetation along environmental gradients that prevail in the study area using the relative importance values of 25 perennials in 62 quadrates, followed by multivariate data analysis was presented. Al together, 74 species (25 perennials, 41 annuals, 5 short-lived perennials and 3 biennials) belonging to 70 genera and 25 families of the flowering plants were recorded and one related to pteridophyta. *Poaceae, Fabaceae*, *Asteraceae*, *Chenopodiaceae* and *Brassicaceae* were the largest families, and constitute more than 56.76% of the total number of recorded species. Therophytes and chamaephytes were the most frequent, denoting a typical desert life-form spectrum. Phytochorological analysis revealed that 64 % of the studied species were Pluri-regional elements, of which 19 % being Cosmopolitan chorotype. It also showed the percentages of the Mediterranean species were 47.29% and 31.07%of the Saharo-Sindian species. Classification of the vegetation was analysed using TWINSPAN technique resulted in the recognition of six vegetation groups, each of definite floristic composition. Antimicrobial and acaricidal activities of methanolic extract for some wild taxa of the study area were screened. There were similarity for some species which found in northern coastal regions and other related to wild vegetation of the southern part of eastern desert of Egypt.

Key words: Acaricidal activities, antimicrobial activities, floristic composition, palm groves, vegetation analysis. western desert, Egypt, wild flora.

INTRODUCTION

The western desert extends over a vast area (which covers two-thirds of Egypt) occupying about 681,000 km^2. It is composed of large, rocky surface with the highest portion in the south western corner where Gebel (mountain) Uweinat is found. North of Uweinat, the Gilf el-Kebir plateau (100 m a. s.l) formed of Nubian sandstone occurred.

This plateau is characterized by scarps which slope sharply towards large depressions in the east and north; Kharga and Dakhla depressions. To the north of this plateau another plateau with arms extend in several directions. This plateau is composed of limestone and is lower in elevation than the Gilf el-Kebir plateau, and constitutes the main land from feature west of the Nile Valley. Hollowed out in the plateau surface are two great depressions, those of Farafra and Bahariya.

The area of the former is more than 3000 km², and the latter has an area of about 1800 km^2. The Qattara–Siwa depression is considered to be part of a huge depression in the northern sector of the Western Desert. The Nubian sandstone aquifer in oasis belongs to Lower Cretaceous and mainly consist of coarse to medium sands with high permeability (Soliman, 2013).

Precipitation decreases from 150 mm at the coast to practically zero in the south, and southwest Egypt is known as the driest part of the globe. Well-marked wadis comparable to those of the eastern Desert are not found. Another salient feature, resulting from arid condition, is the uniformity of the surface as compared with other parts of North Africa. Though considered barren, the Western Desert supports plants in areas with enough water resources (mainly underground). The oases are the most prominent features of the western desert of Egypt. They are green patches amidst the surrounding sterile desert. Siwa, Bahariya, Farafra, Dakhla and Kharga are the five inhabited Egyptian Oases which contain the largest underground-water reservoir (Nubian sandstone aquifer) known in the whole desert (El-Hadidi, 2000).

During the last three decades, plant life of the major inhabited oases in the western desert have been intensively studied: Bahariya (Abd El-Ghani, 1981), Farafra and Faiyum (Abd El-Ghani, 1985), Kharga and Dakhla (El-Sheikh and Yousef. 1981; Himida, 1966; Migahid *et al*., 1960), Qara Oasis (Abd El-Ghani, 1992), Siwa Oasis (Abd El-Ghani, 1994, 2000), around springs oasis(Abd El-Ghani and Fawzy, 2006), Wadi El-Natrun (Abd El-Ghani *et al*., 2014) and Abu-Tartur mining area (Abu-Ziada *et al*., 2016).

On the other hand, the flora and vegetation of uninhabited oases from the same desert were studied, e.g., Kurkur (Boulos, 1966), Moghra (Girgis *et al*., 1971), Nabta (El Hadidi, 1980), Bir Safsaf, El Shab, Nuwaimsa and others (Bornkamm and Kehl, 1990).

The two-spotted spider mite (TSSM), Tetranychusurticae, is a member of the family

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Tetranychidae that contains many harmful species of plant-feeding mites (Borror *et al*., 1989). TSSM is the most notorious pest responsible for significant yield losses in many economic crops, vegetables and fruit trees in Egypt (Ahmed, 1988 and Salman, 2007).

The objectives of this investigation are:

1. Recognizing the different dominant plant communities in the study area.
2. Assessing the role of the edaphic factors controlling the distribution of the plant communities.
3. Screening some biological activities of some wild taxa recorded (antimicrobial and acaricidal).

MATERIALS AND METHODS

Climatic data of Kharga and Dakhla oases

Climatically, the study areas can be classified as arid and hyperarid (Ayyad and Ghabbour, 1986). A hyper arid province with mild winters (10 - 20ºC) and very hot summer (< 30ºC) and includes the south western part of the western desert, where Farafra, Dakhla and Kharga oases are situated. The hyper arid province with mild winter and hot summer (20 - 30ºC), covering the eastern desert and the north eastern part of the western desert, where the Nile valley up to Qena and the oases of Siwa and Bahariya are located. Available records of some meteorological data for the studied oases are shown in (Table 1).

Table (1): Climate of study area according to The Köppen-Geiger climate classification system classifies its climate as hot desert (BWh)(2013).

Station	Air temperature		Rainfall (mm)	Relative Humidity (%)	Monthly Sunshine hr.
	Max.	Min			
Kahrga	50.3	16.2	0	37.9	3,790.8
Dakhla	49.5	13.8	0	34.4	3,943.4

The climate of Dakhla oasis is hot and dry, with a high rate of evaporation, a high level of solar radiation (sunshine), and no rainfall. The aridity index used by the United Nations Environment Program (UNEP, 1997), indicates that this district lies in a hyper-arid region, with annual rainfall close to 0.0 mm.

Study area

The present study aims at monitoring wild vegetation assemblages associated with palm fields at Kharga, Dakhla and Paris oases of Nubian Desert. Kharga extends roughly north-south parallel to the Nile valley. It is located 140 Km south of Assiut City. Bounded by longitudes 30˚20̀ and 30˚40̀ east and at latitudes 25˚05̀ and 25˚30̀ north (CONOCO, 1987). The Nubian Sandstone aquifer in Kharga oases belongs to Lower Cretaceous and mainly consist of coarse to medium sand with high permeability.

Kharga Oasis has one of the longest continuous records of human use of groundwater in the world. Groundwater in Kharga is considered the sole source for water used mainly for irrigation and other purposes which naturally flowing 279 shallow wells and springs and 12 deep wells (Soliman, 2013). Paris oasis extends 90 km south Kharga and considered an extension to Kharga and located at longitudes 30˚11̀ to 30˚26̀ East and latitudes 24˚40̀ to 24˚51̀ north (El-Ghonamey, 2015; New *et al*., 2002).

Dakhla Oasis is located in the heart of the Western Desert of Egypt between longitudes 28˚30̀ and east and latitudes 25˚30̀ and 29˚22̀ east and latitudes 25˚29̀ and 25˚55̀ north, 190 km to the West of Kharga Oasis. Dakhla extends 155 km from Tenieda village in the east to Mawhoub village in the west (Fig. 1) with an area about 155 km long and 60 km wide suitable for agriculture (Kato *et al*., 2014). It contains highly fertile lands, it is rich with water and it supports a higher population than Kharga Oasis.

Dakhla is the biggest oasis in western desert of Egypt and lies farther away from the main cities. The whole distribution of the Dakhla oasis (17 settlements) contains a number of smaller oases, separated by hills or desert. Dakhla was fed by about 520 springs and ponds, and others only yield water through use of electric pumps (Sefelnasr *et al*., 2014).

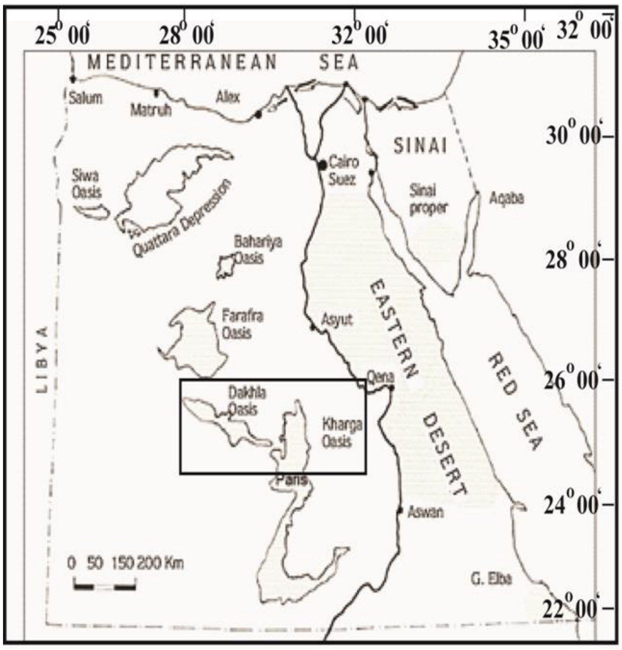

Figure (1): A map showing the study area (Dakhla, Kharga, Paris Oases

Soil analysis

Soil samples were collected from each site as a profile (composite samples) at a depth of 0-25 cm. Calcium carbonate was estimated using Bernard's calcimeter of the type described by Piper (1947). Soil water extracts at 1:5 were prepared for determination o soil salinity (EC), soil reaction (pH), chlorides and sulphates (Jackson, 1967; Allen and Stainer, 1974; Jackson, 2005). Soil texture, organic matter and CaCO3 were estimated according to Allison and Moodie (1965).

Floristic analysis

Life forms have close relationships with environmental factors and climate types can be characterized by the pre vailing life forms in plant communities growing under a given climatic regime, using the proportions of species in each life forms class, or the biological spectrum (Carvalho da Costa *et al*., different regions indicates similar climatic conditions (Malik, *et al*., 2007), and it can be indicator of micro and macro climate (Duran and Hamzaoglu, 2002) Alternative systems of life forms have been developed by (Mueller-Dombois and Ellenberg, 1974; Mack, 2003)

Chorological affinity is another part of floristic studies that refers to geographical distributions and adaptation of plants to environmental variations. Each plant species have a certain ecological extension and tolerate a spatial environmental condition.

Geographical distribution of plants depends on living condition and environmental adaptation of that species (Esmailzadeh *et al*., 2006; Najafi *et al*., 2007). Plant distribution is a valuable source of data for biogeography, habitat requirement models, conservation of threatened species, regions of provenance for plant genetic resources and species selection for environmental restoration (González and Martín, 2006). A chorotype can show the geographic area where the groups of species could occur (Báez *et al*, 2005).

In each stand, the annual and perennial species were listed. Nomenclature was according to Täckholm (1974) and Boulos (1999 and 2005). Life forms were identified according to the scheme of Raunkiaer (1937) and floristic categories following many authors as quoted by Ahmed (2003).

Data analysis

Sixty two quadrates were selected randomly in the study area. The quadrate size was about 10x10m (approximately the minimal area of the plant communities). The relative density and relative cover of species in each was estimated in spring 2014. In order to obtain an effective analysis of the vegetation and related environmental factors, both classification and ordination techniques were applied. Only species present in at least two quadrates were included in the analysis.

TWINSPAN is a divisive hierarchical classification method that doubles the number of groups at each division (positive and negative groups are formed at each dichotomy). The procedures simultaneously classify both samples and species directly, constructing an ordered two-way table to exhibit the relationship between them clearly as possible (Hill, 1979; Økland, 1990).

The computer program CANOCO 3.12 (TerBraak, 1987 and 1992) was used for all ordinations. Preliminary analyses were made using Detrended Correspondence Analysis DCA to check the magnitude of change in species composition along the first ordination axis.

CCA was used to determine the relationships between vegetation data and environmental variables (Hill and Gauch, 1980). TerBraak (1986) suggests using DCA and CCA together to see the variation in species data is accounted for by the environmental data. Ten soil parameters were included: electric conductivity (EC), pH, calcium carbonate (CaCO3), organic matter (OM), silt, clay and sand, SO_2^{--}, HCO_3^-, porosity and maximum water holding capacity. The variables in the CCA biplots were represented by arrows pointing in the direction of maximum variation, with their length proportional to the rate of change. Each arrow determines an axis on which the species points can be projected. When quadrate points were projected perpendicularly to the (prolonged) arrows, their order represents approximately the ranking of weighed averages with respect to the values of the factors involved.

Biological activities for some collected taxa

a) *Acaricidal activities*

Laboratory screening of two-spotted spider mites at conditions (27˚C ±2 and 65±5% relative humidity). Castor bean, *Ricinus commumis* L. (Family: Euphorbiaceae) is considered one of the main wild host for *Tetranychcus urticae*. A culture of many adult females of *T. urticae* in plates were hold using different plant extracts by immersion disks of castor bean leaves in specific plant extract for 15 seconds and repeated for other plant extracts. Each plate contain 3 discs, each disk contain 10 individuals of adult females (Ismail *et al*., 2007).

b) Antimicrobial activities

Methanol extracts of some wild taxa in the studied area namely: *Lepidium sativum, Brassica tournefortii, Tephrosia purpurea, Prosopis farcta, Vicia monantha, Ambrosia maritima, Verbesinaen celioides, Bidens pilosa, Torilis arvensis, Plantago lagopus, Chrosophora oblongifolia, Echium rauwolfii* and *Abotilon pannosum*, were tested against five species of pathogenic bacteria and one fungus (*Candida albicans*). Each of the extracts was dissolved in Dimethyl sulfoxide (DMSO) (1mg/ml).

Whatman filter paper discs were cut with standard size (5mm) and sterilized in an autoclave. The paper discs were soaked in the desired concentration of the extracts and placed aseptically in the Petri dishes containing nutrient agar media (agar 20g + beef extract 3g + pepton 5 g) and seeded with five pathogenic bacteria, namely: *Shigella dysentariae, Escherichia coli, Pseudomonas aeruginosa* (gram -ve bacteria), *Staphylococcus aureus, Klebsiella pneumonae* (gram

+ve bacteria). The Petri dishes were incubated at 36˚C and the inhibition zones were recorded after 24 h of incubation for bacteria and *Candida*. Each treatment was replicated three times (Roberts and Wink, 1998; Hanna, 2008).

RESULTS

Taxonomic patterns

A total of 74 species (41 annuals, 5 short-lived perennials, 3 biannuials and 25 perennials) belonging to 27 family (one Pteridophyta, two monocot families and twenty five families related to Dicots) of vascular plants were recorded (Fig. 2).

The largest families were *Poaceae* (15), *Fabaceae* (12) and *Asteraceae* (9). The largest genera include *Plantago Sp., Brassica Sp., Silene* sp. and *Chenopodium* sp. (2 for each). The common but less important perennials *Prosopis farcta, Alhagi graecorum, Acacia nilotica, Calotrops procera, Hyphaene thebaica, Abutilon pannosum, Pluchea dioscoridis, Sesbania sesban, Ricinus communis.* Common annuals include *Sonchus oleraceus, Euphorbia peplus, Plantago lagopus, Bidens pilosa, Oxalis corniculaas, Cenchrus biflorus, Tephrosia purpurea* and *Ambrosia maritima* as short-lived perennial

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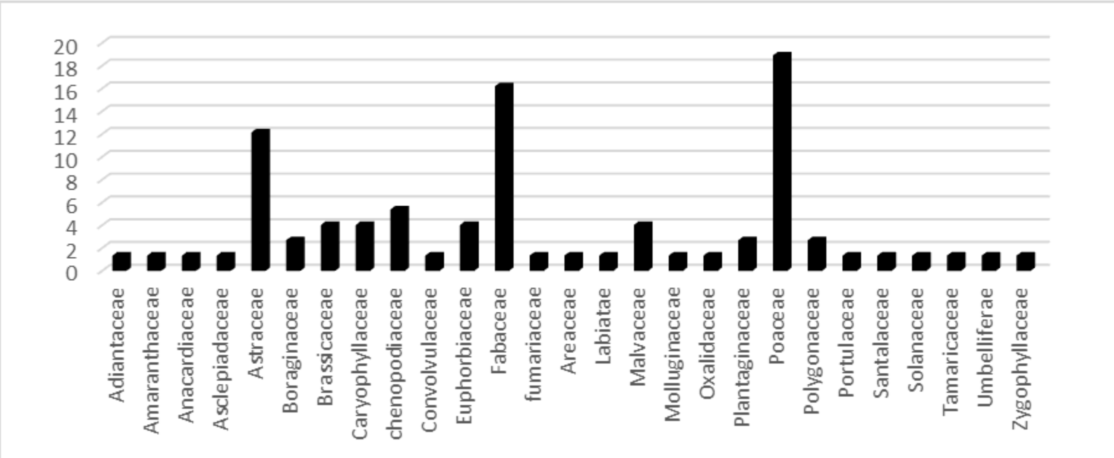

Figure (2): Spectra of families representing wild flora of palm fields of the study area.

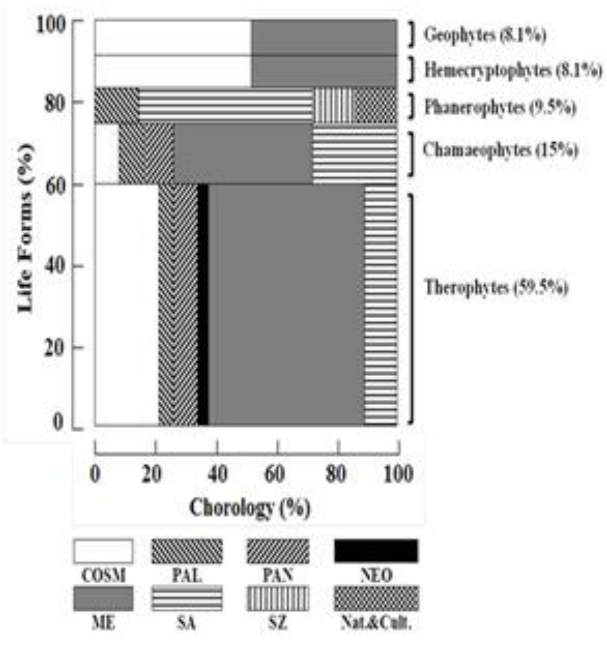

Figure (3): Spectra of life forms and chorotypes of the studied species in palm grooves.

The life-forms classes by Raunkiaer system showed that the most important groups were therophytes. In the present study, the dominant life forms were therophytes are included (59.46%), followed by chamaephytes (14.86%), phanerophytes (9%), hemicryptophytes and geophytes (8.11%) each. Spectrum of life forms for plant species was shown (Fig. 3).

In the present investigation, the chorogical affinity of the study area proved that, the recorded plant species are belonging to three phytogeographical regions:

a. Pluriregional elements represented by 47 species (63.54%), these elements were distinguished into 14 species (18.99%) as Cosmopolitan, 13 species (17.57%) ME+IT+ES, 9 speccies (12.16%) ME + IT + SS, 5 species (6.67%), Palaeotropic 4 species (5.41%) Pantropical and one species (1.35%) neotropical and SS + SZ + IT.
b. Biregional elements represented by 19 species (25.67%), these elements were classified into 9 species as SS + SZ, 6 species ME + IT,3 species SS+ ME and one ME + ES.
c. Monoregional elements represented by 7 species (9.45%) as ME, SS, IT and SZ.

Classification of vegetation

The application of TWINSPAN on the relative importance values (IV) of the 25 perennial species recorded in 62 sampled quadrates helped to distinguish six vegetation groups (Table 2, Fig. 4). These groups named after their leading dominant species (those have

Table (2): Mean values and standard deviation (±SD) of species composition and distribution within the six vegetation groups in the study area

Species	Vegetation groups VG (A)	VG (B)	VG (C)	VG (D)	VG (E)	VG (F)
Abutilonpannosum (Forst.) Schltdl.	0	0	0.05±0.33	0	0	0
Acacia nilotica(L.)Delile	16.54±23.38	0	0	0	0	0
*Adiantumcapillus-veneris*L.	0	0	1.05±6.53	0	0	0
Aeluropuslagopoides(L.) Trin	0	0	0	0	0	6.93±9.80
*Alhqgigraecorum*Boiss.	0	0	0	3.87±8.66	0	0
*Amaranthuslividus*L.	0	0	0.43±1.99	0	0	0
*Ambrosia maritima*L.	10.72±15.16	10.33±14.61	4.49±10.52	1.14±2.56	6.07±14.98	7.57±10.6
Anagallisarvensis L.	43.42±61.40	0	15.79±21.45	0	5.46±5.12	13.28±18.78
*Arundodonax*L.	30.32±42.87	0	0	0	0	0
*Avenafatua*L.	0	0	1.19±3.66	0	0	0
Bassiaindica(Wight) A.J.Scott	0	0	0	0	1.59±5.26	0
Beta vulgaris L.	0	0	4.42±12.02	0	0	0
*Bidenspilosa*L.	0	21.89±30.96	6.27±17.10	0	3.93±7.59	0
*Brassica rapa*L.	0	0	0.06±0.38	5.96±13.34	0	0
*Brassica tournefortii*Gouan	0	0	2.09±6.41	5.16±8.89	2.55±4.49	0
Calotropisprocera(Aiton)W.T. Aiton	26.65±37.69	0	0	0	0	0
*Cenchrusbiflorus*Roxb.	0	11.77±16.65	0.28±3.08	1.87±4.19	6.15±8.44	0
Chenopodium album L.	0	0	1.67±4.91	2.15±4.80	4.23±7.87	0
*Chenopodiummurale*L.	0	0	7.55±15.29	0	0.19±0.64	0
*Cichoriumendivia*L.	0	0	2.18±6.83	0	0	0
*Convolvulus arvensis*L.	0	0	1.23±4.98	0	0.87±2.87	0
Conyzaaegyptiaca (L.)Dryand.	0	12.22±17.28	1.00±5.06	0	0	0
Crosophoraoblongifolia(Delile) Spreng	0	0	0	1.18±2.65	0	0
Cynodondactylon(L.) Pers.	0	0	3.76±14.94	2.09±4.67	6.51±13.47	0
Dactylocteniumaegyptium(L.)Willd.	0	10.57±14.95	0.29±2.90	0	0	0
Dichanthiumannulatum(Forssk.)Stapf	0	0	2.32±9.36	2.69±6.01	0	0
*Echiumrauwolfii*Delile	0	0	0	9.65±13.65	0	0
Eleusineindica(L.) Gaertn.	0	0	0	3.80±8.50	0	11.06±15.64
Emexspinosa(L.) Campd.	0	0	4.55±11.89	0	4.12±6.27	0
Euphorbia peplus L.	0	0	19.73±22.74	0	1.31±4.35	0
*Fumariadensiflora*DC	0	0	0.70±2.61	0	0	0
*Glinuslotoides*L.	0	0	1.49±6.87	0	0.23±0.76	0
*Glycyrrhizaglabra*Linn.	0	4.74±6.71	0±1.05	0	0	0
Hyphaenethebaica(L.) Mart.	47.78±0.59	0	0	0	0	0
Imperatacylindrica(L.) Raeusch.	0	34.47±0.98	1.97±5.76	0	0	0
*Lathyrushirsutus*L.	0	0	3.12±11.87	5.55±12.40	0	0
Launaeamucronata(Forssk.)Muschl.	0	0	1.80±7.03	31.29±31.75	20.89±6.69	20.23±8.67
*Lepidiumsativum*L.	0	0	4.76±11.47	0	1.68±5.58	0
*Loliumperenne*L.	0	11.29±15.97	17.66±18.03	0	3.83±6.38	0
*Malvaparviflora*L.	0	0	2.84±6.56	0	0.87±1.99	0
*Medicagolitoralis*Rohde ex Loisel.	0	0	0.46±2.88	6.49±11.42	2.15±5.72	0
Melilotusindicus(L.)All.	0	0	7.29±10.83	2.78±6.23	16.28±9.71	0
Menthalongifolia(L.) Huds.	0	14.06±19.89	0±3.11	0	0	0
*Oxalis corniculata*L.	0	0	13.21±30.28	0	0	37.87±53.55
Phalaris minor Retz.	0	0	0.83±2.75	0	20.47±41.15	0
Phragmites australis(Cav.) Trin. Ex Steud.	0	0	2.84±15.79	0	0	0
*Plantagoarenaria*Waldst.&Kit..	0	0	0	5.77±9.60	22.87±43.06	0
Plantagolagopus L.	0	0	11.19±26.58	0	0	0
Plucheadiscoridis(L.) DC.	7.51±10.62	16.26±22.99	0±3.59	0	0	12.60±17.82
*Portulacaoleracea*L.	0	0	0	6.71±9.87	0	0
Prosopisfarcta(Babks& Sol.)Macbr.	0	0	1.56±6.88	0	0	0
Pseudognaphaliumluteoalbum(L.)	0	12.18±17.22	0.38±3.55	0	0	0
*Ricinuscommunis*L.	0	0	0.46±2.88	0	0	0
Rumexdentatus L.	0	0	1.41±8.84	0	0	0
*Sidaalba*L.	0	0	2.42±15.12	0	0	0
*Silenesucculenta*Forssk.	0	0	1.74±6.20	0	12.04±30.85	0
*Silenevivianii*Steud.	0	0	4.54±16.16	3.15±4.41	8.78±17.66	0
Sesbaniasesban(L.) Merr.	8.63±12.21	14.92±21.09	0±3.29	0	0	0
Setariaviridis(L.) P. Beauv.	0	0	1.69±5.01	0	0	0
Solanumnigrum L.	0	0	2.06±5.45	0	0	0
Sonchusoleraceus L.	0	0	11.68±16.04	3.76±8.39	4.95±5.50	6.54±9.24
Sorghum virgatum(Hack.) Stapf.	0	0	0.83±3.89	1.24±2.77	0	0
Sporobolusspicatus(Vahl) Kunth	0	0	0	0	3.56±11.81	0
Stellariapallida(Dumort.)Murb.	0	25.31±35.79	6.53±16.64	0	0	0
Tamarixnilotica(Ehrenb.) Bunge	8.43±11.93	0	0	0	0	20.22±5.42
*Thesiumhumile*Vohl. var. humile	0	0	0	9.57±21.41	0	0
Torilisarvensis(Huds.) Link	0	0	5.99±12.13	0	0	0
*Trifoliumresupinatum*L.	0	0	4.71±9.50	0	0.25±0.84	0
Trephrosiapurpurae(L.)Pers. *subsp. apollinea*	0	0	0	62.93±42.40	3.98±9.15	0
Trichodesmaafricanum(L.) R.Br.	0	0	0	1.43(3.21	0	0
Verbesinaencelioides(Cav.)Benth.	0	0	0.91±4.19	19.31±27.42	30.21±27.16	9.62±13.59
*Viciamonantha*Retz.	0	0	0	0	3.98±11.52	0
Vicia sativa L.	0	0	1.01±3.59	0	0	0
Zygophyllum album L. f. *var. amblyocarpum*	0	0	0	0	0	54.09±76.51

the highest relative IV) as follows: (A) *Hyphaene thebaica*, (B) *Bidens pilosa- Imperata cylindrica*, (C) *Lolium perenne- Euphorbia peplus*, (D) *Tephrosia purpurea- Launaea mucronata*, (E) *Verbesina encelioides- Plantago arenaria* and (F) *Zygophyllum album- Oxalis corniculata*.

Table (2) summarise the mean values and the standard deviations of the six vegetative groups. Table (3) show mean values and the standard deviations of the measured soil variables, and the diversity indices in the six groups derived from TWINSPAN-classification.

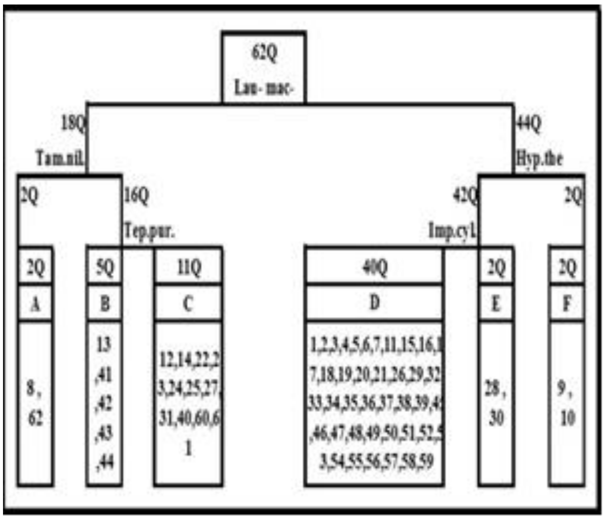

Figure (4): TWINSPAN Dendrogram showing cluster analysis of the studied 62 sample quadrates distributed in palm fields, with six vegetation groups (A-F) at third level.

Group (A) *Hyphaene thebaica*

This vegetation group dominated the saline depressions with soils of low pH values and low levels of carbonate content. Other physical soil properties specially, fine sand fraction is effective variable for this group. While *Acacia nilotica*, *Calotropis procera*, *Tamarix nilotica* and *Sesbania sesban* constitate the shrub layer, the herb layer showed the lowest share of annuals.

Group (B) *Imperata cylindrica*

The landscape of this group was characterized by a combination of *Imperata cylindrica* and *Biden spilosa* found on the sand plains with deep loose soil under the shade of old large palms. It represents a transitional zone between the non-saline and saline habitats. This group was differentiated by only two woody species *Sesbania sesban* and *Pluchea dioscoridis*, while the herb layer was dominated by many annual herbs (*Bidenspilosa, Conyzaaegyptiaca, Pseudognaphai lumluteoalbum, Stellaria pallida, Glinus lotoides, Cenchrus biflorus* and *Dactyloctenium aegyptium*) and perennial herbs (*Ambrosia maritima , Glycyrrhiza glabra, Mentha longifolia, Imperata cylindrical* and *Lolium perenne*).

Group (C) *Lolium perenne- Euphorbia peplus*

This was the second largest group of quadrates (30), and the most diversified among the other vegetation groups (Table 2). It inhabited relatively saline palm fields on coarse sand soils with high electrical conductivity and bicarbonate contents. Many annual herbs, at the foot of palm as *Amaranthus viridis, Anagallis arvensis, Cichorium endivia, Bidens pilosa, Conyza aegyptiaca, Verbesina encelioides, Brassica tournefortii, Lipidium sativum, Silene viviani, Chenopodium murale, Chenopodium album, Euphorbia peplus, Melilotus indicus, Vicia sativa, Lathyrus hirsutus, Trifolium resupinatum, Medicago littoralis, Fumaria densiflora, Malva parviflora, Glinus lotoides* and *Torilis arvensis*. The shrub layer was represented by some species like *Abutilon pannosum, Prosopis farcta* and *Ricinus communis*.

Group (D) *Tephrosia purpurea*

This vegetation group inhabited fine sand and high levels of chlorides and sulphates**.** This group is characterized by variations of annuals like *Trichodesma africanum, Silene viviani, Melilotus indicus, Echium rauwolfii, Plantago arenaria, Thesium humile, Verbesina encelioides, Brassica tournefortii, Sonchus oleraceus and Eleusine indica.*

Group (E) *Verbesina encelioides- Plantago arenaria group*

This group comprised 29 species *Verbesina encelioides* recorded. The quadrates of this group are characterized by soil with low levels of electrical conductivity (EC) organic matter and coarse sand with high contents of chlorides and sulphates. Sand sheets covered the foot of palms and enriched with *Verbesina encelioides and Plantago arenaria.* The sites of this group were covered with dense vegetation of annuals species such as; *Anagallis arvensis, Bidens pilosa, Verbesina encelioides, Brassica tournefortii, Lepidium sativum, Silene viviani, Chenopodium murale, Chenopodium album, Bassia indica, Euphorbia peplus, Melilotus indicus, Vicia monantha, Medicago littoralis, Fumaria densiflora, Malva parviflora, Cenchrus biflorus* and *Emex spinosa.*

Group (F) *Zygophyllum album*

This group was the least diversified (2 species) among the recognized groups. It found on soil with the highest levels of fine sand and EC. Sporadic species include 11 species,e.g., *Tamarix nilotica, Launaea mucronata, Pluchea dioscoridis, Anagallis arvensis, Verbesina encelioides, Eleusine indica, etc* .Multivariate analysis were used in this study, and also carried out in many studies in different regions of Egypt (Mostafa and Zaghloul, 1996; Spinguel *et al*., 2006; Shaltout *et al*., 2010). In the study area, the development of plant communities has been mainly influenced by edaphic condition and irrigation scheme of palm fields.

DCA ordination of stands

Figure (5) showed the ordination of the DCA analysis of the floristic data set. The 62 quadrates were plotted along axes 1 and 2, and tend to cluster into six groups as derived from TWINSPAN classification described above. This diagram displayed graphically that group C was transitional in its composition between the other groups. Quadrates of E and D groups were separated towards the positive end of DCA axis 1, while those of groups A and B were separated along the other end. DCA axis 2 with an eigenvalue of 0.547.

The species-environment correlation (Table 3) was also high: 0.0.934 and 0.908 for DCA axis 1 and 2 showing that the species data were related to the measured environmental variables. It was found that, certain species attain their highest ecological and sociological performance in a particular habitat, which referred here to their preferential habitat. In general, six main habitats were distinguished: their preferential species was proved in Table 4. Orchards (palm fields) exhibit the typical ancient pattern of agriculture, where the underground water is available.

CCA ordination was used to verify the correlation analysis between the vegetation and effective soil factors Figure (7). Correlation analysis indicated that, the separation of species along the first axis, showed that, *Verbesina encelioides- Plantago arenaria* (VG E), *Tephrosia purpurea- Launaea mucronata* (VG D) exhibted significant corellation with high content of SO_4 and Clanaions, while *Hyphaen ethebaica* (VG A) *and Zygophyllum album- Oxalis corniculata* (VG F) were significantly related with fine sand where these four groups were separated on the left of axis 1.

On the right side of CCA diagram, *Imperata cylindrica* (VG B) and *Lolium perenne*, *Euphorbia peplus* (VG C) showed significant correlations with numerous soil factors such as EC, coarse sand, porosity, W.H.C., O.C. and fine fractions (silt and clay).

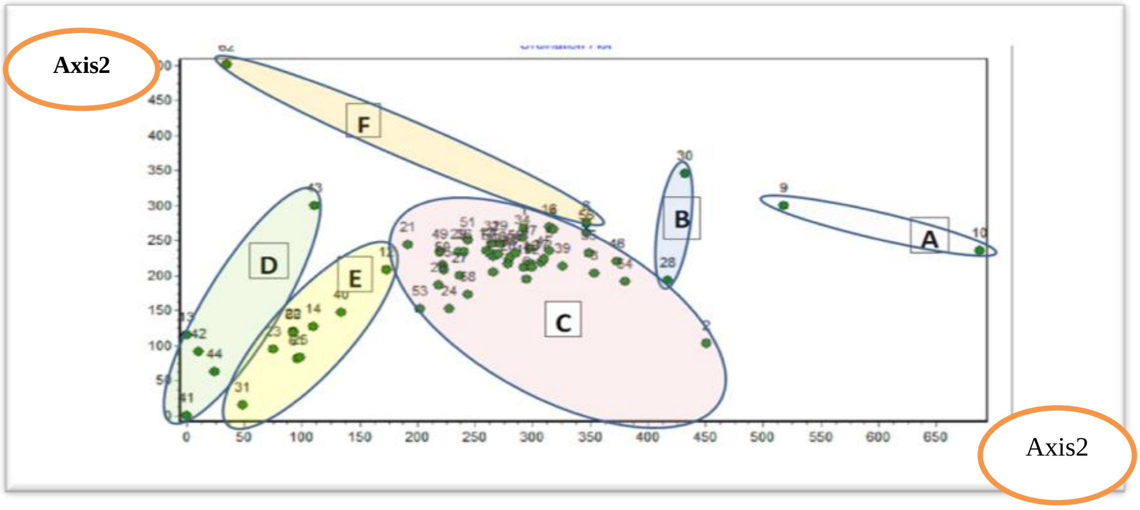

Figure (5): The application of DCA confirmed the correlations among these communities

Table (3): Comparison of the results of ordination by DCA and CCA: eigenvalues and species-environment correlation for the first three axes are given.

Axis	1	2	3
Eigenvalues			
DCA	0.843	0.547	0.447
CCA	0.422	0.279	0.214
Species-environment correlation coefficient			
DCA	0.934	0.908	0.828
CCA	0.776	0.644	0.731

Table (4): Mean values and standard deviation (±SD) of soil variables of the quadrates supporting six vegetation groups (A-F) obtained by TWINSPAN. M.W.H.C.=maximum water holding capacity, OC=organic carbon, EC=Electrical conductivity

	TWINSPAN Vegetation Groups					
Soil Variables	**A**	**B**	**C**	**D**	**E**	**F**
coarse sand	12.47±12.01	2.48±0.09	14.33±12.75	8.09±7.70	8.93±7.39	7.48±5.55
fine sand %	63.78±37.22	89.09±6.53	74.18±9.36	76.31±4.98	75.65±7.65	82.18±6.53
silt &clay %	8.26±3.27	8.09±5.95	13.24±5.74	15.37±8.39	15.15±7.22	11.65±3.73
Porosity %	49.26±15.25	59.04±3.11	52.22±10.01	56.91±12.19	46.72±11.56	39.14±3.69
W.H.C. %	27.26±8.02	29.79±8.39	35.19±10.98	30.48±7.75	30.36±8.37	28.24±1.51
O.C. %	1.23±0.04	6.30±2.97	3.78±2.63	4.01±2.86	3.35±3.02	0.9±0.25
$CaCO_3$ %	4.75±0.35	2.75±1.06	4.39±2.23	4.60±3.42	4.91±1.77	2.75±3.18
EC	337±28.28	159±132.94	425.03±327.86	195±88.85	282.18±207.34	503±371.94
Cl^{-}%	0.11±0.07	0.01±0.004	0.04±0.07	0.03±0.02	0.19±0.28	0.2±0.07
SO_4^{--}%	0.08±0.06	0.06±0.09	0.08±0.08	0.12±0.21	11.37±37.02	0.39±0.14
HCO_3^{-}%	0.14±0.06	0.092±0.0	5.04±30.07	0.07±0.02	0.16±0.09	0.09±0.09
pH	8.25±0.07	8.90±0.14	8.53±0.37	8.72±0.28	8.65±0.40	7.9±0.0

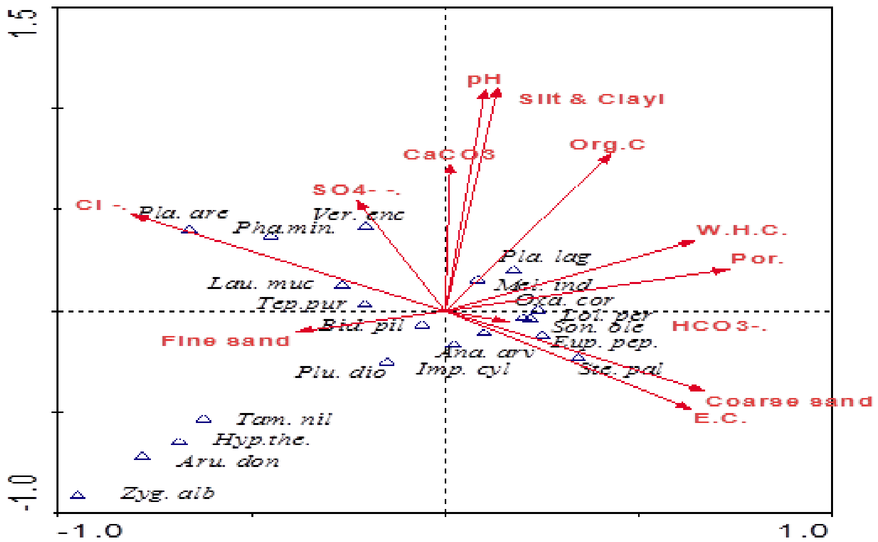

Figure (6): CCA species environment biplot, with arrows representing the soil factors and closed triangles (Δ) indicating the 25 important species. For species abbreviations see Table(4). A-F are ths six TWINSPAN vegetation groups.

Biological activities for some collected taxa

Acaricidal screening of some Egyptian wild desert plants

As shown in Table (5) the percentage of mortality of Tetranychcusurticaeusingm ethanolic extracts of some wild plants was recorded as follow: the highest percentage was 86.6% for *Chrosophora oblongifolia*, 80% for *Brassica tournifortii* and *Tephrosia purpurea*, 73.3% for *Vicia monatha* then 70% for both of *Verbesina encelioidea* and *Plantago lagopus*. So further studies are required for indicating using the wild plant extracts as acaricidal substances.

Antimicrobial screening of some Egyptian wild taxa

Sustainable amount of new antibiotic available in the market obtained from natural or semi synthetic resources are obtained from about 20% of the plants present in world which were submitted to pharmaceuticalor biological test.

As can be seen from the analytical survey of results obtained from the zone of inhibition of methanol extracts, of twelve selected wild taxa, there were no positive effect on the examined bacteria except for *E. coli*.

DISCUSSION

Geographic distribution of terrestrial plant species is often limited by climatic factors, by competition between species that perform better under their local environment and by the reduced reproductive success of range limit**.**This pattern of life-form spectrum displays a strong resemblance to that given by Abd El-Ghani and Fahmy(1998) in the Feiran Oasis, , and also by and also by Mostafa and Zaghloul (1996) in South Sinai (Egypt). Such finding seems to be the response to a more hot and dry climate, human and animal impacts and short-time variation of water availability

Table (5): The percentage of mortality of TSSM (two-spotted spider mites) treated with methanol extracts of some wild plants recorded in Palm fields

No	Scpecies	Families	Mortality %	
			After 3 days	After 7 days
1	***Lepidium sativum* L.**	Brassicaceae	3.3	50
2	***Brassica tornifortii* Gouan**		6.6	80.0
3	***Tephrosia purpurea* L.**		6.6	80.0
4	***Prosopisfarcta* (Bank& Sol.)**	**Fabaceae**	26.6	50.0
5	***Viciamonatha* Retz**		16.6	73.3
6	***Ambrosia maritime* L.**		10.0	63.3
7	***Verbesina encelioidea* (Cav.)Benth.**	Asteraceae	6.6	70.0
8	***Bidans pilosa* L.**		33.3	40.0
9	***Torilis arvensis* (Huds.)Link.**	**Apiaceae**	3.0	56.6
10	***Plantago lagopus* L.**	Plantaginaceae	36.6	70.0
11	***Chrosophora oblongifolia* (Delile) Spreng**	Euphorbiaceae	10.0	86.6
12	***Echium raoulfii* Delile**	Boraginaceae	28.6	66.6
13	***Abotilon pannosum* (G. Forst.) Schltdl**	Malvaceae	15.0	60.0

According to Takhtajan (1969), northern Egypt belongs to the Mediterranean region of the Holarctic kingdom and middle and southern Egypt belong to the Saharo-Sindian region of the Palaeotropical Kingdom. Quezel (1978); Wickens (1978) and Shmida (1985), consider the Saharo-Sindian region to be partially belonging to the Holarctic and Palaetropical Kingdoms.

Davis and Hedge (1971) and Wickens (1984) believe that the Saharo- Sindian flora has been derived from Mediterranean, Sudanian and to a lesser extent Irano-Turanian elements. Multivariate analysis were used in this study, and also carried out in many studies in different regions of Egypt (Mostafa and Zaghloul, 1996,; Spinguel *et al*., 2006; Shaltout *et al*., 2010).

In the study area, the development of plant communities has been mainly influenced by edaphic condition and irrigation scheme of palm fields. With regard to the stands which were separated along the first axis (eigenvalue =0.843), expressing the high floristic variations among vegetation groups, and indicating a complete turnover in species composition took place (Hill, 1979). Canonical correspondence analysis (CCA) was used to perform direct gradient analysis (TerBraak and Prentice 1988) and to determine the relationships between vegetation data and environmental variables (Jean & Bouchard, 1993).

Many of the recorded species in the present study are common weeds in the winter and summer crops as in the Nile region, e.g.: *Convolvulus arvensis, Chenopodium murale, Anagallis arvensis, Bidens pilosa, Euphorbia peplus, Lolium perenne, Melilotus indicus, Malva parviflora, Oxalis corniculata* as reported by (Mashaly *et al.*,2009), this may be attributed to human interference and agricultural practice in. The grains and seeds of crops are generally contaminated with the seeds of common weeds.

Along the gradients of decreasing precipitation, vegetation varies from grasslands to shrublands (Westoby, 1980). The relative advantage of palms over grasses when water is limiting, as in the study area, can be explained by their extensive root systems which can utilizing water stored in different soil depths. The upper dry layer of the surface deposits acts as a protective layer, moisture is stored in subsurface layers, and the under lying sandstone provides added water storage capacity. The presence of a sub-surface layer that is permanently wet is a well-known phenomenon in the Egyptian Deserts (Kassas and Batanouny, 1984). The dominance of both therophytes (59.46%) and chamaephytes (14.86%) over other life forms seems to be a response to the hot dry climate and human and animal interferences.

The insecticidal property of *Tephrosia purpurea* whole plant was tested against *Callosobruchus maculates*, the pest on *Paseolus mungo* (Diwan and Saxena, 2010). The hexane extract from *Tephrosia egregia* showed potent larvicidal activity against *Aedes aegypti* (Arriaga *et al*., 2009a). The whole plant extract of *Tephrosia purpurea* was tested for its larvicidal activity against the larvae of *Culexquinque fasiciatus* (Virupanagouda *et al*., 2011). The extract showed 100% mortality in very small doses suggesting its beneficial use in controlling the mosquito reproduction (Deepak *et al*., 2012).Crushed seeds of *Lepidium sativum* mixed with fresh cattle faces, were used to control ticks (Regassa, 2000). The results indicated that both plant extracts could act as larvicides and growth inhibitor agents. *Ambrosia maritima* can beconsidered to be a potential acaricide for biocontrol of larvae and adult *Hyalommaan atolicum* ticks in the field (Osman *et al*., 2012). Finally, as many microorganisms have high resistance for methanolic extracts of the examined taxa, this may be due to the methanol extracts need more fractionation to obtain more pure chemical constituents may be become more effective for make inhibition for the growth of pathogenic bacteria (Dawidar *et al*., 2009; Azeez, *et al*.,2015 and Makkawi, *et al.*,2015).

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تحليل الكساء الخضري البري المصاحب لحقول النخيل في بعض واحات الصحراء الغربية بمصر

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الملخص العربى

تم دراسة الكساء النباتي الطبيعي المصاحب لحقول النخيل في الخارجة والداخلة وباريس ، حيث تعتبر الواحات في الصحراء الغربية المصرية من اهم سماتها الطبوجغرافية، وهي عبارة عن رقع خضراء تتوسط صحراء جرداء خالية تماما من الكساء النباتي، وهو مايطلق عليه الصحراء العقيمة.، فمعدل الجفاف فيها حسب إحصائيات الأمم المتحدة يصنفها في نطاق الصحاري شديدة الجفاف. وبتقدير القيمة النسبية الهامة للكساء الخضري فقد تم تسجيل ٢٥ نوع نباتي مُعمر في ٦٢ مربع ، وتم حصر ٧٤ نوع ينتموا الي ٧٠ جنس و٢٥ فصيلة ، وتمثل النجليات والقوليات والمركبة والزربيحية والخردلية أكبر الفصائل تواجداً بنسبة حوالي ٦٠%. وجود نسبة كبيرة من الحوليات يشير إلي أن الكساء النباتي صحراوي النزعة في حقول النخيل. ويمثل ١٩% من الأنواع النباتية واسعة الإنتشار الجغرافي حول العالم، يليها ٤٧ نوع تنتمي إلي بيئة البحر المتوسط ٣١نوع ينتمي للصحراء العربية والآسيوية .وباستخدام تحليل التصنيف و التسلسل ثنائي الإتجاه (TWINSPAN) تم فصل ستة مجموعات نباتية ذات تركيب فلوري محدد وقد كان للعوامل البيئية وعمليات الزراعة في حقول النخيل الأثر في ظهور نباتات برية متنوعة مصاحبة لها. وقد وجد أن هناك تطابق بين بعض الأنواع النباتية التي تنمو في ساحل البحر المتوسط الذي يحد الصحراء الغربية من الشمال وكذلك الكساء النباتي في الجزء الجنوبي من الصحراء الشرقية. ومن الناحية التطبيقية فقد تم استخدام المستخلص الميثانولي لمجموعة من النباتات المسجلة لدراسة تأثيرها علي بعض أنواع الميكروبات وكذلك تأثير المستخلصات علي الأكاروس (كآفة زراعية تضر بالمحاصيل المصرية وأشجار الفاكهة). أما بالنسبة لتأثير بعض النباتات البرية النامية في حقول النخيل علي بعض البكتريا الممرضة فقد أظهرت النتائج مقاومة هذه السلالات للمستخلص الميثانولي للنباتات محل الدراسة.