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FLORISTIC FEATURES OF THE PLANT COMMUNITIES ASSOCIATED WITH SOME SPECIES OF GENUS *EUPHORBIA* IN EGYPT

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ABSTRACT

The present study provides an investigation of the floristic features, including list of plant species distribution, life-span, life-form spectra and floristic analysis of the plant communities associated with selected five species of genus Euphorbia (Euphorbiaceae) namely, Euphorbia helioscopia L., Euphorbia heterophylla L., Euphorbia peplus L., Euphorbia prostrata Aiton and Euphorbia retusa Forssk. in Egypt. This study also aims to investigate the floristic structure of plant species to be used in measurement of plant diversity and ecological conservation plan of the study area in the future. The total number of the recorded plant species surveyed in the study area was 155 species belonging to 123 genera and related to 36 families. These species were classified into three major groups according to their duration (life-span) as follows: 63 perennial species, 5 biennial species and 87 annual species. The main families were: Poaceae, Asteraceae, Chenopodiaceae and Brassicaceae. The recorded species were also grouped under five types of life forms as follows: therophytes, cryptophytes (comprising geophytes and helophytes), hemicryptophytes, chamaephytes and nanophanerophytes. Sixty species or about 38.71 % of the total number of the recorded species were Mediterranean taxa. These taxa were either Pluriregional, Bi-regional or Monoregional. It has been also found that, 58 species were either Cosmopolitan (12.90%), Pantropical (12.26%), Palaeotropical (9.68%) or Neotropical (2.58 %). On the other hand, the Monoregional Saharo-Sindian element was represented by 21 species (13.55%).

Keywords: *Euphorbiaceae, Nile Delta, Eastern desert, flora, life form, chorotype.*

INTRODUCTION

Plant life in the Nile region of Egypt has raised the attention of numerous scientists during the last decades. El-Hadidi (1993) pointed out that, development of agriculture over the last 5-6 millennia has resulted in a continuous change of the natural vegetation, that it becomes difficult to recognize most of its original features. During the last two millennia and up to the present, El-Hadidi and Fayed (1995) reported that the number of the recorded weeds in the farmland increased to reach about 470 species (about 22.5% of the total flora of Egypt).

In rainy countries, agriculture depends principally upon rainfall and rivers are rarely used to irrigate the crops. In arid countries, like Egypt, rainfall is negligible and does not provide enough water necessary to meet the

agricultural requirements. The Nile region of Egypt may be ecologically divided into two main subregions; 1) The Deltaic Mediterranean coast which is a narrow belt influenced greatly by the sea and 2) The Nile system which is the lands affected mainly by the water of the River Nile (Zahran and Willis, 2009). The Nile Delta region is flourished by weeds, which seem to be promising economically. Some weeds can be used as forages, agro-industrial, raw material and drug industry.

The terms weeds, weed vegetation and weed flora are commonly used in the literature concerned with Egyptian flora. The Egyptian weed flora is a characteristic feature of the man-made habitats such as cultivated fields, gardens, palm groves, orchards, lawns, road sides, canal banks, canals, channels, ditches, drains, etc. (Kosinova, 1974 a & b). During the last few years, the weeds attracted the attention of numerous scientists to study their ecology, uses, productivity and management.

Weeds are one of the important components in the agroecosystems. Their persistence is remarkable in view of the efforts to eliminate them and warrants greater attention (Radosevich and Holt, 1984). Management, control and phytosociology of weeds have a great interest all over the world. In Egypt, the efforts have directed towards the utilization of renewable resources of the cultivated and non-cultivated areas to produce more food and forage. Such efforts would be more successful and fruitful if they are based on previous knowledge of the environmental characteristics comprising soil, climate, vegetation, animal and human interference.

Weeds are classified according to their growth habit as annuals, biennials or perennials. They are also classified according to the season during which they assume most of their growth: winter or summer weeds. Perennial weeds are of several types known as: taproot perennials, creeping perennials , tuberous perennials, perennials with fibrous roots, bulbous perennials and perennials with corms (Boulos and El-Hadidi, 1994).

River Nile water in Egypt is characterized by a network of irrigation and drainage canals over the broad alluvial expanses of the Nile Valley, Nile Delta and Nile Fayium. The banks of canals and drains in Egypt are usually cleared of weeds once or twice a year. Soon after clearance the weeds start to appear again. The vegetation on the banks arises from the banks themselves, from windborne seeds and from the water. There is a competition between the plants already on the banks and those reaching the banks (Mashaly, 2003).

Egypt's desert is the Sahara, which stretches across much of northern Africa. The few plants that have adapted to the Sahara rely on water retention and protection from animals in the form of spines or toxins. The plants that thrive are in and around the River Nile, which cuts through Egypt and provides fertile soil in the desert. Although the Sahara encompasses multiple countries, certain plants are found only around Egypt and have important uses or symbolic meanings (Ozenda, 1983).

The family Euphorbiaceae (spurge family)

comprise about 290 genera and 7500 species, mainly in tropical America and Africa, in both humid and arid regions; a few genera also in temperate regions, genus *Euphorbia* include about 1600 species distributed in tropical and temperate regions (Zohary, 1972). *Euphorbiaceae* is mostly includes monoecious herbs, shrubs, and trees, sometimes succulent and cactus-like, comprising one of the largest families of plants, with 300 genera and 5000 species that are further characterized by the frequent occurrence of milky sap (Meickle, 1985). The genus *Euphorbia* is the largest in family Euphorbiaceae, comprising more than 2000 species and ranging from annuals to trees, nearly global distribution but especially tropical, subtropical and warm-temperate regions (Davis *et al.,* 1988). Boulos (2000) reported that, family Euphorbiaceae includes 340 genera and about 8100 species, where genus *Euphorbia* comprise about 2000 species, Cosmopolitan, but especially tropical, subtropical and warm-temperate regions. Boulos (2009) also mentioned that, *Euphorbia* is the largest genus (41species) among the flora of Egypt. Family Euphorbiaceae is of considerable economic importance, in medicine, some species of Euphorbiaceae proved effective against genital herpes (Betancur-Galvis *et al.,* 2002). Some species of the genus *Euphorbia* have been used as medicinal plants for the treatment of skin diseases, migraine, and intestinal parasites and as wart cures. They all produce a white latex which they exude when cut, and this sap is often toxic (Govaerts *et al.,* 2000; Frodin, 2004; Noori *et al.,* 2009). The present study aims at the investigation of the floristic features including: record of the weed flora, life-span, life-form spectra and floristic categories of the plant species in the study area to detect the taxonomic and phytogeographical significance of its floristic components.

STUDY AREA

The Nile Delta is a classic Delta with a triangular shape broader at its base than the sides. The middle section of the Mediterranean coastal land of Egypt (Deltaic coast) extends from Abu-Quir (in the west, Long. 32°19' E) to Port-Said (in the east long.31°19' E) with a length of about 180 km, and with a width in a N-S direction for about 15 km from the coast (Mashaly, 2002). On the other hand, Cairo Suez desert road is located in the northern part of the Eastern Desert of Egypt (Isthmic Desert) which extends east of the Nile Delta. This locality represents the natural xeric habitat which is mainly inhabited by xerophytic vegetation. Cairo – Suez desert road extends for about 130 Km long. The gravel desert is one of the most characteristic features of this road.

The study area is located in some selected governorates in the northern part of Nile Delta and Eastern Desert regions of Egypt, which comprises different habitats (Figure 1). These habitats include:

1- Canal bank habitats were selected in four representative governorates in the north of Nile Delta region namely: Damietta, El-Dakahlia, Kafr El-Sheikh and El-Behira.
2- Cultivated land habitats were selected in the same above mentioned governorates.
3- Desert habitats were chosen in Cairo Suez desert road.

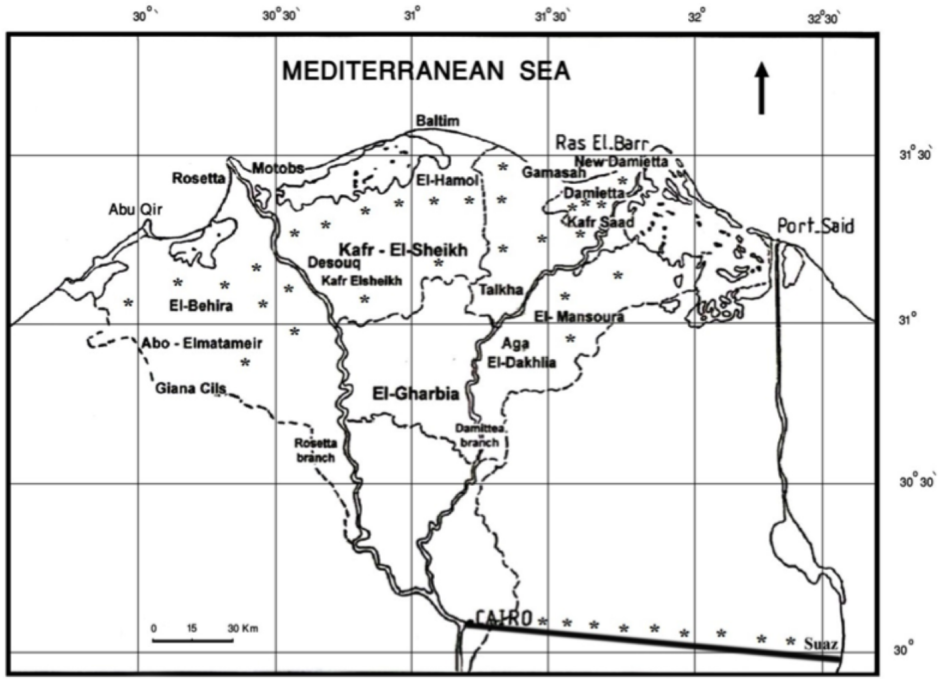

Figure (1) : Map of the Nile Delta region showing the locations (*) of the study area.

MATERIALS AND METHODS

After a regular field visits to the different sites of the study area, a number of stands were selected for sampling vegetation associated with some chosen *Euphorbia* spp. in the various habitat types recognized in the study area. The stands were distributed in the study area to cover all apparent physiographic variations and to ensure sampling of wide range of vegetational variations. The total number of sampled stands was 100 (area of each stand = 25 m^2) distributed in the study area as indicated in Figure (1).

During each visit, plant specimens were collected from different sites for identification. All samples were deposited in the Herbarium of Faculty of Science, Mansoura University. The description and classification of life-forms in the present study were according to Raunkiaer (1934 & 1937). The classification, identification and floristic categories were according to Tutin e*t al.* (1964-1980), Davis (1965 - 1985), Zohary (1966 & 1972), Täckholm (1974), Meickle (1977 & 1985), Feinbrun-Dothan (1978 & 1986) and up to date by Boulos (1999-2005).

RESULTS AND DISCUSSION

1-Floristic composition :

The recorded plant species in the present study are summed in terms of presence values (P %). Table (1) showed the floristic composition in the three habitats, namely: canal bank, cultivated land and desert. The tabulated data revealed that, the total number of plant species in the study area was 155 species. The highest number of species (92) was

recorded in the canal bank habitat representing about 59.35% of the total number of recorded species, while the cultivated land habitat was represented by 90 species (58.06%), but the desert habitat was represented by 41 species (26.45%).

The recorded species in the study area (155) can be classified under three major groups according to their duration as follows: 63 perennial species, 5 biennial species and 87 annual species.

Out of the perennial species, 19 taxa were recorded during all visits in two habitats (P = 66.6%), these perennials include *Atriplex semibaccata, Convolvulus arvensis, Cynanchum acutum, Cynodon dactylon, Cyperus rotundus, Imperata cylindrica, Mentha, longifolia, Marsilea aegyptiaca*, etc. The remaining 44 perennial species showed a relatively narrow range of distribution (P = 33.33%), these perennials comprise *Alhagi graecorum, Alkanna lehmanii, Alternanthera sessilis, Anabasis articulata, Artemisia monosperma, Atractylis carduus*, etc.

The list of the floristic composition includes only five biennial species, namely Beta vulgaris, *Spergularia marina* (P = 66.6% each), *Centaurea aegyptiaca, Launaea capitata and Rorippa palustris* (P = 33.33% each).

The annual species (87) were classified according to their presence percentages into:

a) Five species attained a wide range of distribution, being recorded in all 3 habitats (P = 100%), which include *Chenopodium murale, Echinochloa colna, Emex spinosa, Malva parviflora and Poa annua.*
b) Thirty-seven species were recorded in 2 habitats (P = 66.6%), such as: *Amaranthus lividus, Anagallis arvensis, Bassia indica, Brassica tournefortii, Coronopus didymus, Phalaris minor, Silybum marianum, Solanum nigrum, Sonchus oleraceus*, ect.
c) Forty-five species were recorded in only one habitat (P =33.3%), such as: *Amaranthus graecizans, Ammanmia baccifera, Astragalus hamosus, Cenchrus biflorus, Dinebra retroflexa, Eclipta prostrata, Juncus bufonius, Plantago lagopus, Reseda decursiva, Rumex vesicarius, Xanthium spinosum,* ect.

The dominance of annuals may be generally attributed to the fact that, annuals have higher reproductive capacity and ecological, morphological and genetic plasticity under high levels of disturbance (Harper, 1977) and agricultural practices (Grime, 1979). The floristic composition in the present study was agreed with the studies of Shaltout and El-Fahar (1991), El-Demerdash *et al.* (1997), Mashaly *et al.* (2002 & 2009 a), Shaltout *et al.* (2005), Galal and Fawzy (2007) and El-Amier *et al.* (2014a).

Table (1) : Floristic composition of the recorded species in the different habitats of the study area.

No.	Species	Life form	Floristic category	Habitat type			Presence	P%
				Canal bank	Cultivated land	Desert		
1- **Perennials :**								
1	*Atriplex semibaccata* R.Br.	H	AUST	+	+	-	2	66.6
2	*Convolvulus arvensis* L.	H	COSM	+	+	-	2	66.6
3	*Cynanchum acutum* L.	H	ME+IR-TR	+	+	-	2	66.6
4	*Cynodon dactylon* (L.) Pers.	G	PAN	+	+	-	2	66.6
5	*Cyperus rotundus* L.	G	PAN	+	+	-	2	66.6
6	*Imperata cylindrica* (L.) Raeusch.	H	PAL+ME	+	+	-	2	66.6
7	*Marsilea aegyptiaca* Willd.	He	PAL	+	+	-	2	66.6
8	*Mentha longifolia* (L.) Huds.	He	PAL	+	+	-	2	66.6
9	*Oxalis corniculata* L.	H	COSM	+	+	-	2	66.6
10	*Persicaria salicifolia* Brouss. ex Willd.	G	PAL	+	+	-	2	66.6
11	*Phragmites australis* (Cuv.) Trin.ex Steud.	G, He	COSM	+	+	-	2	66.6
12	*Phyla nodiflora* (L.) Greene	Ch	PAN	+	+	-	2	66.6
13	*Plantago major* L.	H	COSM	+	+	-	2	66.6
14	*Pluchea dioscoridis* (L.) DC.	Nph	S-Z+SA-SI	+	+	-	2	66.6
15	*Polygonum equisetiforme* Sibthi & Sm.	G	ME+IR-TR	+	+	-	2	66.6
16	*Polypogon viridis* (Gouan) Breistr.	H	ME+IR-TR	+	+	-	2	66.6
17	*Sorghum virgatum* (Hack.) Stapf	G	SA-SI	+	+	-	2	66.6
18	*Symphyotrichum squamatum* (Spreng.) Nesom	Ch	NEO	+	+	-	2	66.6
19	*Veronica anagallis-aquatica* L.	He	COSM	+	+	-	2	66.6
20	*Alhagi graecorum* Boiss.	H	PAL	+	-	-	1	33.3
21	*Alkanna lehmanii* (Tin.) A.DC.	H	ME	-	-	+	1	33.3
22	*Alternanthera sessilis* (L.) DC.	He	PAN	-	+	-	1	33.3
23	*Anabasis articulata* (Forssk.) Moq.	Ch	SA-SI+IR-TR	-	-	+	1	33.3

Table (1) : Continued.

24	*Artemisia monosperma* Delile	Ch	SA-SI+ME	-	-	+	1	33.3
25	*Arundo donax* L.	G, He	Cult. & Nat.	+	-	-	1	33.3
26	*Atractylis carduus* (Forssk.) C.Chr.	H	SA-SI+ME	-	-	+	1	33.3
27	*Atriplex halimus* L.	Nph	ME+SA-SI	+	-	-	1	33.3
28	*Brachiaria mutica* (Forssk.) Stapf	H	PAN	+	-	-	1	33.3
29	*Cleome arabica* L.	H	S-Z+IR-TR	-	-	+	1	33.3
30	*Cyperus alopecuroides* Rottb.	He	PAN	+	-	-	1	33.3
31	*Cyperus articulatus* L.	G, He	PAN	+	-	-	1	33.3
32	*Deverra tortuosa* (Desf.) DC.	Ch	SA-SI	-	-	+	1	33.3
33	*Echinochloa stagnina* (Retz.) P.Beauv.	G, He	PAL	+	-	-	1	33.3
34	*Echium angustifolium* Mill.subsp. *sericeum*	H	ME	-	+	-	1	33.3
35	*Fagonia arabica* L.	Ch	SA-SI	-	-	+	1	33.3
36	*Fagonia mollis* Delile.	Ch	SA-SI	-	-	+	1	33.3
37	*Gypsopila capillaris* (Forssk.) C.Chr.	H	IR-TR+SA-SI	-	-	+	1	33.3
38	*Haloxylon salicornicum* (Moq.) Bunge ex Boiss.	Ch	SA-SI	-	-	+	1	33.3
39	*Haplophyllum tuberculatum* (Forssk.) Juss.	H	SA-SI	-	-	+	1	33.3
40	*Hyoscyamus muticus* L.	Ch	SA-SI	-	-	+	1	33.3
41	*Ipomoea carnea* Jacq.	G	PAN	+	-	-	1	33.3
42	*Launaea mucronata* (Forssk.) Muschl.	H	ME+SA-SI	-	-	+	1	33.3
43	*Launaea nudicaulis* (L.) Hook. F.	H	SA-SI	-	-	+	1	33.3
44	*Leersia hexandra* Sw.	He	PAN	+	-	-	1	33.3
45	*Leptochloa fusca* (L.) Kunth.	G, He	PAN	-	+	-	1	33.3
46	*Panicum repens* L.	G	PAN	+	-	-	1	33.3
47	*Panicum turgidum* Forssk.	H	SA-SI	-	-	+	1	33.3
48	*Paspalum distichum* L.	G	PAN	+	-	-	1	33.3
49	*Paspalidium geminatum* (Forssk.) Stapf	He	PAL	+	-	-	1	33.3
50	*Pennisetum setaceum* (Forssk.) Chiov.	H	ME+PAL	+	-	-	1	33.3
51	*Pergullaria tomentosa* L.	Ch	SA-SI	-	-	+	1	33.3
52	*Persicaria lapathifolia* (L.) Gray	G	ER-SR+ME	+	-	-	1	33.3
53	*Pulicaria undulata* (L.) C. A. Mey. subsp *undulata*	Ch	SA-SI	-	-	+	1	33.3

Table (1) : Continued.

54	*Retama raetam* (Forssk.) Webb &Berthel	Nph	SA-SI	-	-	+	1	33.3
55	*Ricinus communis* L.	Nph	CULT and NAT	-	+	-	1	33.3
56	*Saccharum spontaneum* L. var. *aegyptiacum* (Willd.) Hackel	G, He	PAL+ME	+	-	-	1	33.3
57	*Scophularia deserti* Delile	Ch	SA-SI	-	-	+	1	33.3
58	*Suaeda pruinosa* Lange	Ch	ME	+	-	-	1	33.3
59	*Tamarix nilotica* (Ehrenb.) Bunge	Nph	SA-SI+S-Z	-	+	-	1	33.3
60	*Typha domingensis* (Pers.) Poir. Ex. Steud.	He	PAN	+	-	-	1	33.3
61	*Verbena officinalis* L.	Ch	COSM	+	-	-	1	33.3
62	*Zilla spinosa* (L.) Prantl subsp. *spinosa*	Ch	SA-SI	-	-	+	1	33.3
63	*Zygophyllum coccineum* L.	Ch	SA-SI+S-Z	-	-	+	1	33.3
Biennials:								
1	*Beta vulgaris* L. var. *cicla*	Th	ME+IR-TR+ER-SR	+	+	-	2	66.6
2	*Spergularia marina* (L.) Griseb.	Th	ER-SR+ME+IR-TR	+	+	-	2	66.6
3	*Centaurea aegyptiaca* L.	Th	SA-SI	-	-	+	1	33.3
4	*Launaea capitata* (spreng.) Dandy	Th	S-Z+SA-SI	-	-	+	1	33.3
5	*Rorippa palustris* (L.) Besser	Th	ER-SR+IR-TR+ME	+	-	-	1	33.3
Annuals:								
1	*Chenopodium murale* L.	Th	COSM	+	+	+	3	100
2	*Echinochloa colona* (L.) Link	Th	PAN	+	+	+	3	100
3	*Emex spinosa* (L.) Campd.	Th	ME+SA-SI	+	+	+	3	100
4	*Malva parviflora* L.	Th	ME+IR-TR	+	+	+	3	100
5	*Poa annua* L.	Th	COSM	+	+	+	3	100
6	*Amaranthus lividus* L.	Th	ME+IR-TR	+	+	-	2	66.6
7	*Anagallis arvensis* L. var. *arvensis*	Th	COSM	+	+	-	2	66.6
8	*Avena fatua* L.	Th	PAL	+	+	-	2	66.6
9	*Bassia indica* (Wight) A.J.Scott.	Th	S-Z+IR-TR	+	+	-	2	66.6
10	*Bidens pilosa* L.	Th	PAN	+	+	-	2	66.6
11	*Brassica tournefortii* Gouan	Th	ME+IR-TR+SA-SI	+	+	-	2	66.6
12	*Bromus diandrus* Roth	Th	ME	+	+	-	2	66.6
13	*Capsella bursa-pastoris* (L.) Medik.	Th	COSM	+	+	-	2	66.6

Table (1) : Continued.

14	*Chenopodium album* L.	Th	COSM	+	+	-	2	66.6
15	*Cichorium endivia* L.	Th	ME+IR-TR	+	+	-	2	66.6
16	*Conyza bonariensis* (L.) Cronquist	Th	ME	+	+	-	2	66.6
17	*Coronopus didymus* (L.) Sm.	Th	COSM	+	+	-	2	66.6
18	*Datura stramonium* L.	Th	NEO	+	+	-	2	66.6
19	*Eruca sativa* Mill.	Th	CULT and NAT	+	+	-	2	66.6
20	*Hordeum murinum* L. subsp. *leporinum* (link) Arcang.	Th	ME+IR-TR+ER-SR	+	+	-	2	66.6
21	*Euphorbia helioscopia* L.	Th	ME+IR-TR+SA-SI	+	+	-	2	66.6
22	*Euphorbia heterophylla* L.	Th	PAN	+	+	-	2	66.6
23	*Euphorbia peplus* L.	Th	ER-SR+ME+IR-TR	+	+	-	2	66.6
24	*Lamium amplexicaule* L.	Th	ME+IR-TR+ER-SR	+	+	-	2	66.6
25	*Melilotus indicus* (L.) All.	Th	ME+IR-TR+SA-SI	+	+	-	2	66.6
26	*Mesembryanthemum forsskaolii* Hochst. Ex Boiss.	Th	SA-SI	-	+	+	2	66.6
27	*Phalaris minor* Retz.	Th	ME+IR-TR	+	+	-	2	66.6
28	*Polypogon monspeliensis* (L.) Desf.	Th	COSM	+	+	-	2	66.6
29	*Portulaca oleracea* L.	Th	COSM	+	+	-	2	66.6
30	*Pseudognaphalium luteo-album* (L.) Hilliard & B. L. Burtt.	Th	COSM	+	+	-	2	66.6
31	*Reichardia tingitana* (L.) Roth	Th	ME+SA-SI+IR-TR	-	+	+	2	66.6
32	*Rumex dentatus* L.	Th	ME+IR-TR+ER-SR	+	+	-	2	66.6
33	*Senecio glaucus* L.	Th	ME+SA-SI+IR-TR	-	+	+	2	66.6
34	*Silybum marianum* (L.) Gaertn.	Th	ME+IR-TR+ER-SR	+	+	-	2	66.6
35	*Sisymbrium irio* L.	Th	ME+IR-TR+ER-SR	+	+	-	2	66.6
36	*Solanum nigrum* L.	Th	COSM	+	+	-	2	66.6
37	*Sonchus oleraceus* L.	Th	COSM	+	+	-	2	66.6
38	*Stellaria pallida* (Dumort.) Murb.	Th	ME+ER-SR	+	+	-	2	66.6
39	*Torilis arvensis* (Huds.) Link subsp *neglecta* (Spreng.) Thell.	Th	ME+IR-TR+ER-SR	+	+	-	2	66.6
40	*Urospermum picroides* (L.) F.W.Schmidt	Th	ME+IR-TR	+	+	-	2	66.6
41	*Urtica urens* L.	Th	ER-SR+ME+IR-TR	+	+	-	2	66.6

Table (1) : Continued.

42	*Vicia sativa* L.	Th	ME+IR-TR+ER-SR	+	+	-	2	66.6
43	*Amaranthus graecizans* L.	Th	ME+IR-TR	-	+	-	1	33.3
44	*Amaranthus hybridus* L.	Th	PAL	-	+	-	1	33.3
45	*Amaranthus viridis* L.	Th	PAL	-	+	-	1	33.3
46	*Ammania baccifera* L.	Th	S-Z+IR-TR	+	-	-	1	33.3
47	*Ammi majus* L.	Th	ME+IR-TR+ER-SR	-	+	-	1	33.3
48	*Anthemis cotula* L.	Th	ME	-	-	+	1	33.3
49	*Apium leptophyllum* (Pers.) F. Muell. Ex Benth.	Th	COSM	-	+	-	1	33.3
50	*Astragalus hamosus* L.	Th	ME+IR-TR	-	-	+	1	33.3
51	*Atriplex prostrata* DC.	Th	ME+ER-SR+IR-TR	+	-	-	1	33.3
52	*Bassia muricata* (L.) Ach.	Th	SA-SI+IR-TR	-	-	+	1	33.3
53	*Bromus catharticus* Vahl	Th	ER-SR+ME+IR-TR	-	+	-	1	33.3
54	*Bromus rubens* L.	Th	ME+IR-TR	-	+	-	1	33.3
55	*Calendula arvensis* L.	Th	ME+IR-TR+SA-SI	-	+	-	1	33.3
56	*Cenchrus biflorus* Roxb.	Th	NEO	+	-	-	1	33.3
57	*Chenopodium giganteum* D.Don	Th	PAL	-	+	-	1	33.3
58	*Conyza aegyptiaca* (L.) Dryand.	Th	ME	-	+	-	1	33.3
59	*Coronopus squamatus* (Forssk.) Anch.	Th	ER-SR+ME+IR-TR	+	-	-	1	33.3
60	*Dactyloctenium aegyptium* (L.) Willd.	Th	PAL	-	+	-	1	33.3
61	*Dinebra retroflexa* (Vahl) Panz.	Th	S-Z+SA-SI	-	+	-	1	33.3
62	*Diplotaxis acris* (Forssk.) Boiss.	Th	SA-SI	-	-	+	1	33.3
63	*Echinochloa crus-galli* (L.) P. Beauv.	Th	PAN	+	-	-	1	33.3
64	*Eclipta prostrata* (L.) L.	Th	NEO	+	-	-	1	33.3
65	*Erodium laciniatum* (Cav.) Willd.	Th	ME	-	-	+	1	33.3
66	*Ethulia conyzoides* L.f. subsp. *conyzoides*	Th	PAL	+	-	-	1	33.3
67	*Euphorbia prostrata* Aiton	Th	PAN	-	+	-	1	33.3
68	*Euphorbia retusa* Forssk.	Th	SA-SI	-	-	+	1	33.3
69	*Ifloga spicata* (Forssk.) Sch.Bip.	Th	SA-SI	-	-	+	1	33.3
70	*Juncus bufonius* L.	Th	ME+IR-TR+ER-SR	+	-	-	1	33.3
71	*Lactuca serriola* L.	Th	ME+IR-TR+ER-SR	+	-	-	1	33.3
72	*Lathyrus aphaca* L.	Th	ME+IR-TR+ER-SR	-	+	-	1	33.3

Table (1) : Continued.

73	*Lolium temulentum* L.	Th	ME+ER-SR+IR-TR	-	+	-	1	33.3
74	*Matthiola longipetala* (Vent.) DC.	Th	ME+IR-TR	-	-	+	1	33.3
75	*Pennisetum glaucum* (L.) R. Br.	Th	PAL	-	+	-	1	33.3
76	*Plantago lagopus* L.	Th	ME+IR-TR	-	+	-	1	33.3
77	*Plantago notata* Lag.	Th	IR-TR+SA-SI	-	-	+	1	33.3
78	*Ranunculus sceleratus* L.	Th	ME+IR-TR+ER-SR	+	-	-	1	33.3
79	*Reseda decursiva* Forssk.	Th	SA-SI	-	-	+	1	33.3
80	*Rumex vesicarius* L.	Th	SA-SI+ME+S-Z	-	-	+	1	33.3
81	*Senecio aegyptius* L.	Th	ME+IR-TR+ER-SR	+	-	-	1	33.3
82	*Sesbania sericea* (Willd.) Link	Th	PAL	+	-	-	1	33.3
83	*Setaria verticillata* (L.) P. Beauv.	Th	COSM	-	+	-	1	33.3
84	*Setaria viridis* (L.) Beauv.	Th	PAL	+	-	-	1	33.3
85	*Xanthium spinosum* L.	Th	PAN	+	-	-	1	33.3
86	*Xanthium strumarium* L. .	Th	COSM	-	+	-	1	33.3
87	*Zygophyllum simplex* L.	Th	SA-SI	-	-	+	1	33.3

Abbreviations:

Life -form	
Nph	Nanophanerophytes
Ch	Chamaephytes
H	Hemicryptophytes
G	Geophytes
He	Helophytes
Th	Therophytes

Floristic category	
COSM	Cosmopolitan
PAN	Pantropical
PAL	Palaeotropical
NEO	Neotropical
ME	Mediterranean
ER-SR	Euro-Siberian
SA-SI	Saharo-Sindian
IR-TR	Irano-Turanina
S-Z	Sudano-Zambezian
AUST	Australian
CULT and NAT	Cultivated & Naturalized

2-Plant Life-Span in the Study Area :

According to the duration or life-span, the plant species in the different habitats of the study area in the Nile Delta and desert regions can be classified into three major groups: annuals, biennials and perennials. The total number of species recorded in the study area (155 taxa) was distinguished into 87 annuals (56.13%), 5 biennials (3.23%) and 63 perennials (40.65%). The plant life in the canal bank was floristically considered the richest, where 93 species were recorded and can be categorized into 37 perennials, 3 biennials and 53 annuals. The weed flora of the cultivated lands (87 species) comprise 24 perennials, 2 biennials and 61 annuals. Whereas, the recorded species in the desert habitat (43 species) can be classified into 21 perennials, 2 biennial and 20 annuals.

It is of interest to denote that, the canal bank was floristically the richest habitat in the study area (60.00 %), followed by the cultivated land (46.13 %), then finally by the desert habitats (27.47%). It is also obvious that, the annuals are the most frequent species in each of the cultivated land (70.11 %) and canal bank habitats (56.99), followed by the perennial species (27.59 % and 39.78%, respectively). The annuals and perennials attained a nearly same presence percentages in the desert habitat (46.51% and 48.84%, respectively). Whereas the biennial species in all habitats showed poor representations (Figure 2). These findings were similar to those of Mashaly *et al.* (2002, 2010 & 2012), Mashaly and Awad (2003), El-Halawany *et al.* (2010), Abu Ziada *et al.* (2013 & 2014 a & b) and El-Amier *et al.* (2014 b).

3-Life-Form Spectra in the Study Area

According to Raunkiaer (1934), the life-forms of the plant species in the present study were grouped under five types as follow: therophytes (92 species = 59.36%), cryptophytes (comprising geophytes and helophytes collectively attained 28 species (18.10 %), hemicryptophytes (19 species = 12.26%), chamaephytes (16 species = 10.32 %), nanophanerophytes (5 species = 3.23 %) as shown in Figure (3).

It is evident that, the percentages of the life-form spectra vary from one habitat to the other (Figure 3). In the canal bank, the recorded species (93) can be grouped into five types of life forms: therophytes (60.87 %), cryptophytes (26.09%), hemicryptophytes (10.87%), chamaephytes (4.35%) and nanophaneropytes (2.17%). In the cultivated lands, the recorded species (87) can be also classified into the following life-forms: therophytes (71.11%), cryptophytes (16.67%), hemicryptophytes (10.0 %), nanophaneropytes (3.33 %) and chamaephytes (2.22%). While in the desert habitat, the life-forms of the recorded species (43) were distinguished into: therophytes (51.22%), chamaephytes (29.57%), hemicryptophytes (17.07%), and nanophanerophytes (2.44 %). It was worth to mention that, the life-form spectra in all three habitats of the study area was mainly represented by therophytes and partly by cryptophytes, chamaephytes, hemicryptophytes and nanophanerophytes.

The previous results were agreed with those of other reports by Mashaly (2001), El-Demerdash *et al.* (1990), El-Halawany *et al.* (2010) and El-Amier *et al.* (2014 a & b). The

dominance of therophytes over the other life forms seems to be a response to Mediterranean climate, topography variation and biotic influence (Heneidy and Bidak, 2001). The relatively high values of hemicryptophytes, cryptophytes and chamaephytes may be attributed to the ability of species to resist drought, salinity, sand accumulation and grazing (Orshan, 1990 and Danin; Danin, 1996).

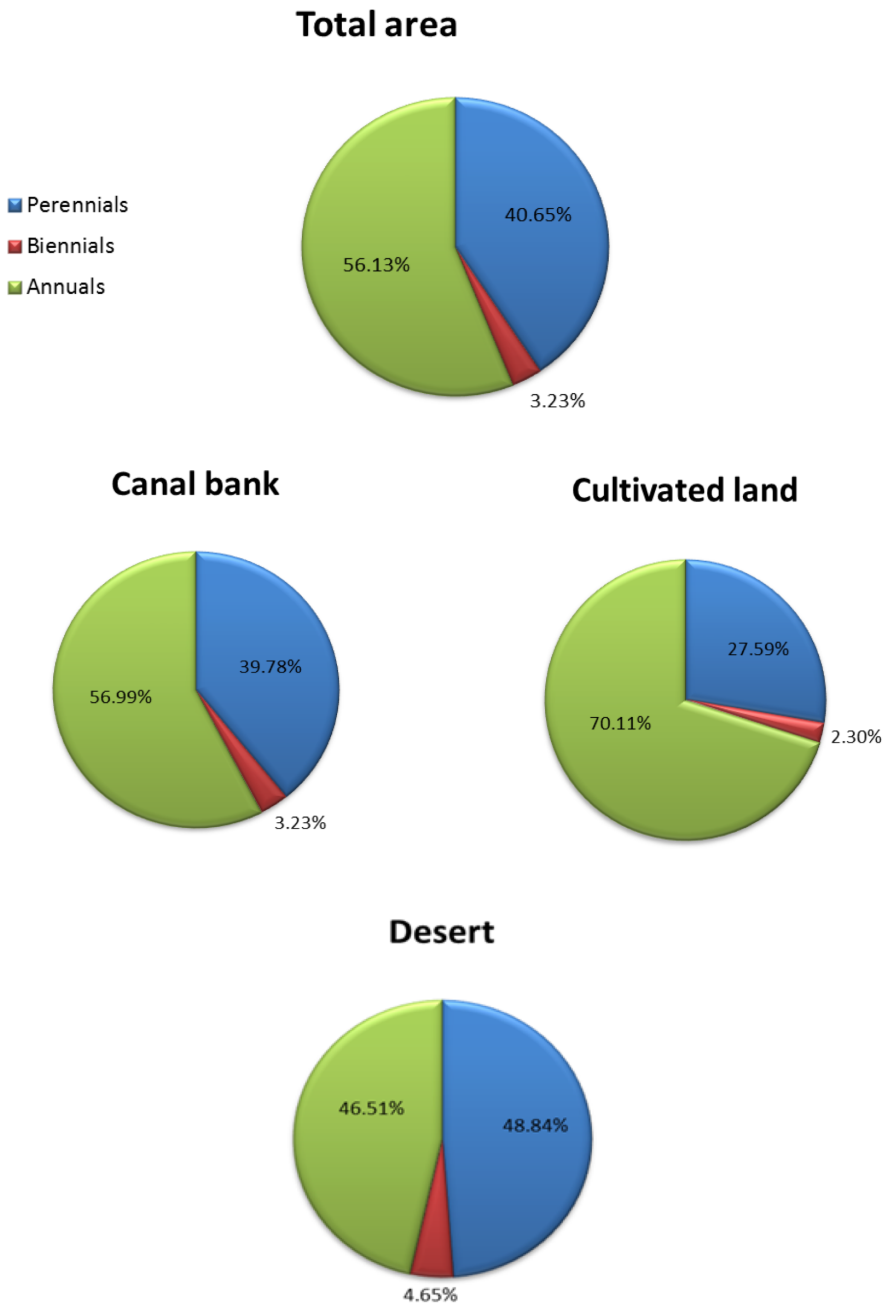

Fig (2) : Plant life span spectra in the different habitats of the study area.

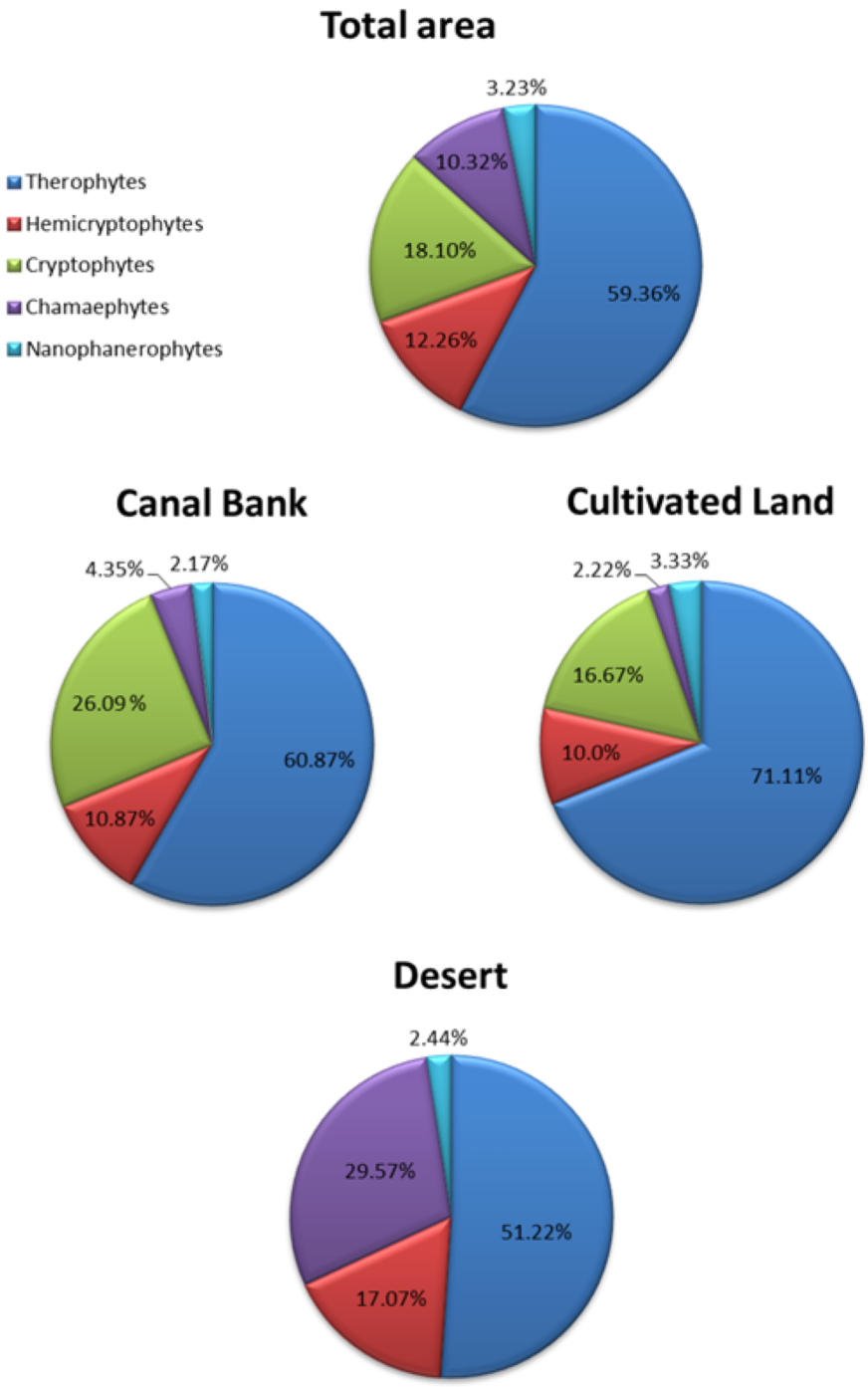

Fig (3) : Plant life-form spectra in the different habitats of the study area.

4-Chorological Categories and Regional Distribution :

Table (2) showed that, the total number of the recorded plant species surveyed in the present study was 155 species belonging to 123 genera and related to 36 families. Poaceae comprises 33 species or about 21.29%, of the total number of recorded species, followed by Asteraceae which include 28 species (18.06%), then Chenopodiaceae 12 species (7.74%) and Brassicaceae 10 species (6.45%). These 4 families were represented collectively by 83 species (53.55% of the total number of recorded species). Fabaceae was represented by 7 species (4.52%). Euphorbiaceae and Polygonaceae were represented by 6 species each (3.87%), while Amaranthaceae was represented by 5 species (3.23%). Apiaceae and Zygophyllaceae were represented by 4 species each (2.58%). Caryophyllaceae, Cyperaceae, Plantaginaceae and Solanaceae were represented by 3 species each (1.94%). The other remaining families (22) were represented by either two or one species only. This was agreed more or less with the findings of many authors: e.g. Quezel (1978) concerning the floristic structure of the Mediterranean Africa, Mashaly (1987) regarding the flora of Dakahlia-Damietta coastal region. El-Kady *et al.* (2000) on the vegetation of the north-west part of the Nile Delta, Mashaly et al. (2002) on the floristic features of Damietta area, El-Halawany (2003) on the vegetation of north Nile Delta and El-Amier *et al.* (2014 a) on the vegetation of sand formations in the coast of Nile Delta.

The regional geographical distribution of the floristic elements in the study area are shown in Table (2). The most common floristic elements of family Poaceae were Pantropical (8 species), Palaeotropical (6 species), Cosmopolitan and Biregional (4 species each), while Pluriregional and Mediterranean Palaeotropical elements (3 species each). In Asteraceae, the most common chorotypes were Biregional (7 species), Pluriregional (6 species) and Saharo-Sindian (4 species), while Mediterranean and Cosmopolitan elements were represented by 3 species each. The most floristic elements in Chenopodiaceae were Biregional (4 species), Cosmopolitan and Pluriregional (2 species each). The floristic elements in family Brassicaceae were Pluriregional (4 species), Cosmopolitan and Saharo-Sindian (2 species each). The floristic elements in family Fabaceae were Pluriregional (3 species) and Palaeotropical (2 species). In Euphorbiaceae, the chorotypes were Pantropical and Pluriregional (2 species each), while in Polygonaceae the chorotypes were Biregional (3 species) and Pluriregional (2 species) and Palaeotropical (one species) . The floristic elements in family Amaranthaceae were Palaeotropical and Biregional (2 species each) and Pantropical (one species). The other families comprise less than 5 species were generally characterized by poor representation of floristic elements.

Table (2) : The principal floristic categories of the families in the study area.

No.	Family	Genus	Species	COSM	PAN	PAL	NEO	Pluri - regional	Bi - regional	ME+PAL	ME	SA-SI	AUST	Cult. & Nat.
1	Poaceae	25	33	4	8	6	1	3	4	3	1	2	-	1
2	Asteraceae	24	28	3	2	1	2	6	7	-	3	4	-	-
3	Chenopodiaceae	7	12	2	-	1	-	2	4	-	1	1	1	-
4	Brassicaceae	9	10	2	-	-	-	4	1	-	-	2	-	1
5	Fabaceae	7	7	-	-	2	-	3	1	-	-	1	-	-
6	Euphorbiaceae	2	6	-	2	-	-	2	-	-	-	1	-	1
7	Polygonaceae	5	6	-	-	1	-	2	3	-	-	-	-	-
8	Amaranthaceae	2	5	-	1	2	-	-	2	-	-	-	-	-
9	Apiaceae	4	4	1	-	-	-	2	-	-	-	1	-	-
10	Zygophyllaceae	2	4	-	-	-	-	-	1	-	-	3	-	-
11	Caryophyllaceae	3	3	-	-	-	-	1	2	-	-	-	-	-
12	Cyperaceae	1	3	-	3	-	-	-	-	-	-	-	-	-
13	Plantaginaceae	1	3	1	-	-	-	-	2	-	-	-	-	-
14	Solanaceae	3	3	1	-	-	1	-	-	-	-	1	-	-
15	Asclepiadaceae	2	2	-	-	-	-	-	1	-	-	1	-	-
16	Boraginaceae	2	2	-	-	-	-	-	-	-	2	-	-	-
17	Convolvulaceae	2	2	1	1	-	-	-	-	-	-	-	-	-
18	Lamiaceae	2	2	-	-	1	-	1	-	-	-	-	-	-
19	Scrophulariaceae	2	2	1	-	-	-	-	-	-	-	1	-	-
20	Verbenaceae	2	2	1	1	-	-	-	-	-	-	-	-	-
21	Aizoaceae	1	1	-	-	-	-	-	-	-	-	1	-	-

Table (2) : Continued.

No.	Family	Genus	Species	COSM	PAN	PAL	NEO	Pluri - regional	Bi - regional	ME+ PAL	ME	SA-SI	AUST	Cult. & Nat.
22	Capparaceae	1	1	-	-	-	-	-	1	-	-	-	-	-
23	Geraniaceae	1	1	-	-	-	-	-	-	-	1	-	-	-
24	Juncaceae	1	1	-	-	-	-	1	-	-	-	-	-	-
25	Lythraceae	1	1	-	-	-	-	-	1	-	-	-	-	-
26	Malvaceae	1	1	-	-	-	-	-	1	-	-	-	-	-
27	Marsileaceae	1	1	-	-	1	-	-	-	-	-	-	-	-
28	Oxalidaceae	1	1	1	-	-	-	-	-	-	-	-	-	-
29	Portulacaceae	1	1	1	-	-	-	-	-	-	-	-	-	-
30	Primulaceae	1	1	1	-	-	-	-	-	-	-	-	-	-
31	Ranunculaceae	1	1	-	-	-	-	1	-	-	-	-	-	-
32	Resedaceae	1	1	-	-	-	-	-	-	-	-	1	-	-
33	Rutaceae	1	1	-	-	-	-	-	-	-	-	1	-	-
34	Tamaricaceae	1	1	-	-	-	-	-	1	-	-	-	-	-
35	Typhaceae	1	1	-	1	-	-	-	-	-	-	-	-	-
36	Urticaceae	1	1	-	-	-	-	1	-	-	-	-	-	-
Total		123	155	20	19	15	4	29	32	3	8	21	1	3
Percentage				12.90	12.26	9.68	2.58	18.71	20.65	1.94	5.16	13.55	0.65	1.94

Egypt is the meeting point of the floristic elements belonging to at least four phytogeographical regions: the African Sudano-Zambesian, the Asiatic Irano-Turanian, the Afro-Asiatic Sahro-Sindian and the Euro-Afro-Asiatic Mediterranean (El-Hadidi, 1993). The floristic analysis of the study area as shown in Table (3) revealed that, 60 species or about 38.71 % of the total number of recorded species were Mediterranean taxa. These taxa were either Pluriregional (29 species =18.71 %), Biregional (23 species =14.84 %) or Monoregional (8 species = 5.16 %). It has been also found that, 58 species or about 37.42 % of the total number of the recorded species were either Cosmopolitan (12.90%), Pantropical (12.26%), Palaeotropical (9.68%) or Neotropical (2.58 %). On the other hand, the Monoregional Saharo-Sindian element was represented by 21 species (13.55%). The other floristic categories were poorly represented where each chorotype was represented by a few number of species (Table 3). In general, the percentages of the Cosmopolitan, Pantropical, Palaeotropical and Neotropical elements were obviously comparable in each of the canal bank and cultivated land habitats in the study area. The different Mediterranean elements were highly represented in both of canal bank and cultivated land habitats (39 taxa each), followed by those in the desert habitat (13 taxa). The other floristic categories were either poorly represented or completely missed in the different habitats. This may indicated that, the chorological analysis of the study area was relatively compatible with the

north-southward distribution of the climatic belts in Egypt. The Chorological analysis in the present investigation was in agreement Egypt is the meeting point of the floristic elements belonging to at least four phytogeographical regions: the African Sudano-Zambesian, the Asiatic Irano-Turanian, the Afro-Asiatic Sahro-Sindian and the Euro-Afro-Asiatic Mediterranean (El-Hadidi, 1993). The floristic analysis of the study area as shown in Table (3) revealed that, 60 species or about 38.71 % of the total number of recorded species were Mediterranean taxa. These taxa were either Pluriregional (29 species =18.71 %), Biregional (23 species =14.84 %) or Monoregional (8 species = 5.16 %). It has been also found that, 58 species or about 37.42 % of the total number of the recorded species were either Cosmopolitan (12.90%), Pantropical (12.26%), Palaeotropical (9.68%) or Neotropical (2.58 %). On the other hand, the Monoregional Saharo-Sindian element was represented by 21 species (13.55%). The other floristic categories were poorly represented where each chorotype was represented by a few number of species (Table 3). In general, the percentages of the Cosmopolitan, Pantropical, Palaeotropical and Neotropical elements were obviously comparable in each of the canal bank and cultivated land habitats in the study area. The different Mediterranean elements were highly represented in both of canal bank and cultivated land habitats (39 taxa each), followed by those in the desert habitat (13 taxa). The other floristic categories were either poorly represented or completely missed in the different habitats. This may indicated that, the chorological analysis of the study area was relatively compatible with the north-southward distribution of the climatic belts in Egypt. The Chorological analysis in the present investigation was in agreement with many studies such as Mashaly *et al.* (1995) on ecological and phytosociological studies in Ismailia-Suez desert road of Egypt, Mashaly (1996) on phytosociology of Wadi Hagul (Red Sea), Mashaly *et al.* (2002) on the floristic features of Damietta area, Mashaly and Awad (2003) on the floristic features of weed flora of orchards in the Nile Delta , Mashaly *et al.* (2009 b) on the floristic features of plant life of the River Nile in Egypt and Mashaly *et al.* (2010) on the floristic features of the canal bank vegetation in Egypt.

Table (3) : Number of species and percentage of various floristic categories of the different habitats in the study area.

Floristic category	Study area		Habitat type						Regional distribution
			Canal bank		Cultivated land		Desert		
	No.	%	No.	%	No.	%	No.	%	
COSM	20	12.90	17	18.48	19	21.11	2	4.88	World-wide
PAN	19	12.26	16	17.39	9	10.00	1	2.44	
PAL	15	9.68	10	10.87	9	10.00	-	-	
NEO	4	2.58	4	4.35	2	2.22	-	-	
Sum	**58**	**37.42**	**47**	**51.09**	**39**	**43.33**	**3**	**7.32**	
ME+IR-TR+ER-SR	22	14.19	18	19.57	15	16.67	-	-	Pluriregional
ME+IR-TR+SA-SI	6	3.87	3	3.26	6	6.67	2	4.88	
ME + SA-SI + S -Z	1	0.65	-	-	-	-	1	2.44	
Sum	**29**	**18.71**	**21**	**22.83**	**21**	**23.33**	**3**	**7.32**	
ME+IR-TR	13	8.39	8	8.70	11	12.22	3	7.32	Biregional
ME+ER-SR	2	1.29	2	2.17	1	1.11	-	-	
ME+PAL	3	1.94	3	3.26	1	1.11	-	-	
ME+SA-SI	5	3.23	2	2.17	1	1.11	4	9.76	
S-Z+SA-SI	5	3.23	1	1.09	4	4.44	1	2.44	
S-Z + IR-TR	3	1.94	2	2.17	1	1.11	1	2.44	
SA-SI + IR-TR	4	2.58	-	-	-	-	4	9.76	
Sum	**35**	**22.58**	**18**	**19.57**	**19**	**21.11**	**13**	**31.71**	

CONCLUSION

The total number of the recorded plant species surveyed in the present investigation was 155 species belonging to 123 genera and related to 36 families. These species include 63 perennials, 5 biennials and 87 annuals. Poaceae, Asteraceae, Chenopodiaceae and Brassicaceae were the main leading families. The life-form spectrum was mainly represented by therophytes and partly by cryptophytes, chamaephytes, hemicryptophytes and nanophenerophytes. The floristic (chorological) analysis in the present study revealed that, 60 species (38.71%) of the total number of the recorded species were Mediterranean taxa, these taxa were either Pluriregional (18.71%), Biregional (14.84%) or Monoregional (5.16%). Also, 58 species (37.42%) were Cosmopolitan (12.90%), Pantropical (12.26%), Palaeotropical (9.68%) or Neotropical (2.58%). The Monore-

gional Saharo-Sindian element was represented by 21 species (13.55%).

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الملخص العربى

التحليل الفلورى للمجتمعات النباتية المصاحبة لبعض أنواع جنس اللبين فى مصر

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تهـدف هـذه الدراســة إلـى عمــل مسـح شامــل للغطــاء النباتـي المصـاحب لعــدد خمســة نباتات بالعائلة اللبينيــة وهـي: *Euphorbia helioscopia, E. heterophylla, E. peplus, E. retusa E. prostrata* في مصر وذلك للتعرف على الأهمية التصنيفية والتوزيع الجغرافي وكذلك الطرز الحياتية والعناصر الفلورية للأنواع النباتية المختلفة بمنطقة الدراسة، كما تهدف هذه الدراسة إلى تسجيل التركيب الفلوري لمنطقة الدراسة وذلك لإستخدامها في قياس التنوع النباتي وخطة الصون البيئي لمنطقة الدراسة في المستقبل. فى هذة الدراسة تم تسجيل ١٥٥ نوعا من النباتات الزهرية التى تنتمى الى ١٢٣جنساً صنفت تحت ٣٦ فصيلة حيث اتضح ان الفصيلة المركبة و النجيلية و الصليبية و الرمرامية هى الفصائل السائدة فى منطقة الدراسة.

كما اشتملت النباتات المسجلة بمنطقة الدراسة على ٦٣ نوعا من النباتات المعمرة و٥ أنواع من النباتات ثنائية الحول و٨٧ نوعا من النباتات الحولية ,وقد تم تقسيم طرز الحياة النباتية الى خمسة مجموعات وهى : طراز الحوليات (therophytes) وطراز المختفيات (cryptophytes) وطراز شبه المختفيات (hemicryptophytes) وطراز النباتات الظاهرة (chamaephytes) وطراز النباتات الزهرية الشجيرية (nanophanerophytes) وأوضح التحليل الفلورى أن هناك ٦٠ نوعاً (٣٨,٧١٪) من النباتات المسجلة تتبع عنصر البحر المتوسط ,كما وجد أن العنصر العالمى يشمل ٢٠ نوعا (١٢,٩٠٪) العنصر الاستوائى ١٩ نوعا (١٢,٢٦٪) والعنصر الاستوائى القديم ١٥ نوعا(٩,٦٨٪) والعنصر الاستوائى الحديث ٤ انواع (٢,٥٨٪) كماأتضح أن عنصر الصحاري – السندي أحادي المنطقة ممثل بعدد كبير نسبياً في الانواع النباتية (٢١ نوعاً) تمثل حوالي ١٣,٥٥٪ من العدد الكلي للنباتات المسجلة بمنطقة الدراسة.

JOESE 5

FLORISTIC FEATURES OF THE PLANT COMMUNITIES ASSOCIATED WITH SOME SPECIES OF GENUS *EUPHORBIA* IN EGYPT

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