MANSOURA JOURNAL OF BIOLOGY
Official Journal of Faculty of Science, Mansoura University, Egypt
E-mail: scimag@mans.edu.eg ISSN: 2974-492X

Floristic Features of the Plant Communities Associated with Some Species of Genus *Cyperus* in Egypt.

Sara S. El-Nabawi1, El-Sayed F. El-Halawany1, Eladel G. Eltanahy1, Yasser A. El-Amier

1 *Botany Department, Faculty of Science, Mansoura University, Mansoura - 35516, Egypt*

**** Correspondence to:*** *yasran@mans.edu.eg; Tel. +201017229120*

Received: 16/ 1/2022
Accepted: 26/1/2022

Abstract The current study investigates the floristic aspects of three Cyperus species (*Cyperus alopecuroides* Rottb., *C. capitatus* Vand and *C. laevigatus* L.), including a list of plant species, life-span, life-form spectra, and floristic analysis of the plant life in the Deltaic Mediterranean coast and canal bank habitats in the Nile Delta. The total number of the recorded plant species surveyed in the present study was 134 species belonging to 113 genera and related to 35 families. Poaceae comprises 29 species of the total number of listed species, followed by Asteraceae (22 taxon), then Chenopodiaceae (10 taxon), Brassicaceae (7 taxon). Caryophyllaceae (5 species), Cyperaceae, Fabaceae and Polygonaceae were represented by 6 taxon each (4.47%). The additional families (20) had two or one species to represent them. The Deltaic Mediterranean coastal desert habitats have the highest number of Mediterranean component (56 taxon). These elements include 22 species of Pluriregional taxa, 23 species of Biregional taxa and 11 species of Monoregional taxa. In the Canal bank habitat, the number of Mediterranean taxa was 37 species, these taxa were either Pluriregional (22 species), Biregional (14 taxon) or Monoregional (one species).

keywords: Cyperus species; Desert; Floristic, Vegetation.

1.Introduction

Egypt's Nile Region can be separated into two ecological subregions: the deltaic Mediterranean coast and the Nile system. The vegetation of the deltaic Mediterranean coastline area is split into landward zones that differ in dominance, composition, and extent depending on (a) landform and (b) distance from the sea, lakes, and cultivated lands. Sand formations, salt marshes, swamps, and potentially cultivated land are the four main types of habitat found along Egypt's deltaic Mediterranean coast [1].

The development of all vegetation types, terrestrial and aquatic, is influenced by several interacting factors. Soil types that develop from parent rock of a given region, combined with climatic factors such as rainfall, temperature and light, determine which plant species will survive under prevailing conditions [2]. Man is the dominant species in ecosystem earth, who, by building dams, adds to his long-demonstrated capacity for technological changes, and who seeks to integrate that skill with an ongoing process of interaction between human and other ecosystem elements [3,4].

Coastal areas are typically rich in natural resources, which provide excellent opportunities for economic activities; particularly resource-based economic activities like agriculture, fisheries, tourism, oil and gas extraction, and maritime transportation, which all tend to be concentrated in these areas. Furthermore, coastal locations serve as important gathering points for a huge number of immigrants with rising need for housing, energy, products, and services [5,6].

Family Cyperaceae (grasses or sedge family) of monocotyledonous flowering plants, contain about 5500 species and belonging to 108 genera. The members of Cyperaceae consist of perennial or annual herbs, rarely shrubs or lianas and are distributed throughout all the continents except Antarctica. The genus *Cyperus* or sedges have a worldwide distribution, especially in temperate regions. About 600 species, tropical and subtropical

regions, extending to northern Central Europe and South Africa [7]. *Cyperus* spp. In Egypt, Täckholm [8] recorded 21 species of *Cyperus* whereas Boulos [7] noted 19 species.

This work mainly aims to study the floristic features including: record of the plant species, life-span, life-form spectra and floristic categories of the wild plants associated with the *Cyperus* species.

2. Materials and Methods

2.1. Study area

A triangle-shaped plain that runs parallel to the Mediterranean Sea is known as the Nile Delta. It is 170 km from north to south and 220 km wide from east to west. It covers over 22,000 km2 and accounts for roughly 63 percent of Egypt's fertile land, whereas the Nile Valley is only about 13,000 km^2 [1]. The Nile flows northwest for about 20 kilometres until it reaches the Delta Barrage, where it splits into two branches: the western (Rosetta branch, about 239 km along) empties into the Mediterranean Sea at Rosetta, and the eastern (Damietta branch, about 245 km along) empties into the Mediterranean Sea at Damietta Figure 1

2.2. Estimation of plant species

The present study is represented by 54 stands (area = 10×10 m) in two sites follows: site 1 represented Deltaic coast (29 stands) and site 2 represented Canal bank (stands). The stands were distributed in the study area to cover different habitats of study area and to ensure sampling of wide range of vegetational variations. All samples were deposited in the Botany Department's Herbarium at Mansoura University's Faculty of Science. The taxonomy of life-forms used in this study was based on Raunkiaer's classification system [9]. Davis [10], Zohary [11], Täckholm [8], Meickle [12], Feinbrun-Dothan [13], and Boulos [7] were used for categorization, identification, nomenclature, and floristic categories.)

3. Results and Discussion

3.1. Floristic Composition and Distribution of Plant Species in the Study Area

The present study's recorded plant species are summed in terms of presence percentages (P %). The floristic composition of plant species in the two habitats, the Deltaic Mediterranean coastal desert and Canal bank habitats, is shown in Table 1. The overall number of plant species in the study region was 134 vascular plant species, according to the tabulated data. The Deltaic Mediterranean coastline habitat had the biggest number of species (96), accounting for around 71.64 percent of the total number of species observed, while the Canal bank habitat had 84 species (62.68 percent).

According to their duration, the 134 species documented in the research region can be divided into three groups: 66 perennial species, 2 biennial species, and 66 annual specie

During each field visit, the perennial species were noted. Out of the perennials, twenty-five plant species have a wide of distribution, where they were recorded in two habitats such as: *Cynodon dactylon* (P=53.70%), *Phragmites australis* (P=48.15%) Imperata cylindrica (P=31.48%), Convolvulus arvensis (P=25.93%), *Cyperus laevigatus* and *Pluchea dioscridis* (P=22.22%, each), *Symphyotrichum squamatum* (P=18.52%) *Cyperus rotundus, Persicaria salicifolia* and *Alhagi graecorum* (P=16.67%, each), etc.

Forty-one perennial species were recorded in one habitat type, among these species with a presence value of are; Cyperus alopecuroides (P=48.15%), Cyperus capitatus (P=31.48%), *Stipagrostis lanata* (P=16.6%), *Echinops spinosus* and *Launaea mucronata* (P=14.18%, each), *Lotus polyphyllos* and *Silene succulent* (P= 12.96%, each), *Typha domingensis*. P=9.26%), *Veronica anagallis-aquatica* and *Juncus rigidus* (P=7.41%, each), etc.

The list of floristic composition includes only two biennial species, namely: *Spergularia marina* and *Rorripa palustris* (P = 9.26% and 5.56, respectively

Figure 1: Map of Egypt and Nile Delta showing the study area.

Table 1. Floristic composition of the plant species of the different habitats in the study area.

Species	Family	Life span	Life form	Floristic category	Habitats		P%
					Canal bank	Coastal area	
Aegilops bicornis **(Forssk)Jaub.&Spach**	Poaceae	Ann.	Th	ME+SA-SI	+	+	3.70
A. kotschyi **Boiss**	Poaceae	Ann.	Th	IR-TR+SA-SI	+	+	3.70
Alhagi graecorum **Boiss**	Fabaceae	Per.	H	ME+IR-TR	+	+	16.67
Alternanthera sessilis **(L.)DC.**	Amaranthaceae	Per.	He	PAN	+	-	1.85
Amaranthus lividus **L.**	Amaranthaceae	Ann.	Th	ME+IR-TR	+	-	1.85
Ammi majus **L.**	Apiaceae	Ann.	Th	ME+IR-TR+ER-SR	+	-	3.70
Anagallis arvensis **L.**	Primulaceae	Ann.	Th	COSM	+	-	5.56
Anchusa humilis **(Desf.) I.M. Johnst.**	Boraginaceae	Ann.	Th	ME+SA-SI	-	+	1.85
Arthrocnemum macrostachyum **(Moric.)K.Koch**	Chenopodiaceae	Per	Ch	ME+SA-SI	-	+	7.41
Arundo donax L.	Poaceae	Per	He, G	Cult. & Nat.	+	+	11.11
Atractylis carduus **(Forssk.) C.Chr.**	Asteraceae	Per.	H	ME+SA-SI	-	+	9.26
Atriplex halimus **L.**	Chenopodiaceae	Per.	Nph	ME+SA-SI	+	-	3.70
A. portulacoides **L.**	Chenopodiaceae	Per.	Ch	ME+IR-TR+ER-SR	-	+	3.70
Avena fatua **L.**	Poaceae	Ann.	Th	PAL	+	-	3.70
Bassia indica **(Wight) Scott.**	Chenopodiaceae	Ann.	Th	IR-TR+SA-SI	+	+	3.70
Beta vulgaris **L.** subsp. maritima **(L.)Arcang**	Chenopodiaceae	Ann.	Th	ME+IR-TR+ER-SR	+	-	3.70
Bidens pilosa **L.**	Asteraceae	Ann.	Th	PAN	+	-	5.56
Brachiaria mutica **(Forssk.)Stapf.**	Poaceae	Per.	H	PAN	+	-	1.85
Brassica tournefortii **Gouan**.	Brassicaceae	Ann.	Th	ME+IR-TR+SA-SI	-	+	1.85
Bromus diandrus **Roth**	Poaceae	Ann.	Th	ME	-	+	5.56
Cakile maritima **Scop**. subsp aegyptiaca **(Willd.) Nyman**	Brassicaceae	Ann.	Th	ME+ER-SR	+	+	11.11
Calligonum polygonoides **L.** subsp. comosum **(L' Her.) Soskov**	Polygonaceae	Per.	Nph	IR-TR+SA-SI	-	+	9.26
Carduus getulus **Pomel**	Asteraceae	Ann.	Th	SA-SI	-	+	3.70
Carthamus tenuis **(Boiss & Blanche) Bornm.**	Asteraceae	Ann.	Th	ME	-	+	3.70
Chenopodium album **L.**	Chenopodiaceae	Ann.	Th	COSM	+	-	12.96
C. murale **L.**	Chenopodiaceae	Ann.	Th	COSM	+	+	29.63
Cichorium endivia **L.** subsp. divaricatum **(Schousb.)P.D.Sell.**	Asteraceae	Ann.	Th	ME+IR-TR	+	-	1.85
Convolvulus arvensis **L.**	Convolvulaceae	Per.	H	COSM	+	+	25.93
Conyza bonariensis **(L.)Cronquist**	Asteraceae	Ann.	Th	NEO	+	+	3.70
Coronopus squamatus **(Forssk.)Aschers.**	Brassicaceae	Ann.	Th	ME+IR-TR+ER-SR	+	-	1.85
Cressa cretica **L.**	Convolvulaceae	Per	H	ME+PAL	-	+	1.85
Cutandia memphitica **(Spreng.) Benth.**	Poaceae	Ann.	Th	ME+IR-TR+SA-SI	-	+	12.96
Cynanchum acutum **L.**	Asclepiadaceae	Per.	H	ME+IR-TR	+	+	5.56
Cynodon dactylon	Poaceae	Per.	G	COSM	+	+	53.70

(L.)Pers.							
Cyperus alopecuroides **Rottb**.	Cyperaceae	Per.	He	PAN	+	-	48.15
C. articulatus **L.**	Cyperaceae	Per.	G, He	PAN	+	-	5.56
C. capitatus **Vand**	Cyperaceae	Per.	G	ME	-	+	31.48
C. conglomeratus **Rottb.**	Cyperaceae	Per.	G	SA-SI+S-Z	-	+	5.56
C. laevigatus **L.**	Cyperaceae	Per	G, He	PAL	+	+	22.22
C. rotundus **L.**	Cyperaceae	Per.	G	PAN	+	+	16.67
Daucus litoralis **Sm**.	Apiaceae	Ann.	Th	ME	-	+	3.70
Desmostachya bipinnata **(L.) Stapf**	Poaceae	Per.	Ch	ME+IR-TR+SA-SI	+	-	1.85
Echinochloa stagnina **(Retz) P. Beauv.**	Poaceae	Per	G, He	PAL	+	+	14.81
Echinops spinosus **L.**	Asteraceae	Per.	H	ME+SA-SI	-	+	14.81
Eclipta prostrata **(L.) L.**	Asteraceae	Ann.	Th	NEO	+	+	12.96
Elymus farctus **(Viv.) Runem. ex Melderis**	Poaceae	Per.	G	ME	-	+	7.41
Erodium laciniatum **(Cav.) Wild.**	Geraniaceae	Ann.	Th	ME	-	+	16.67
Eruca sativa **Mill**.	Brassicaceae	Ann.	Th	Cult.& Nat.	+	-	1.85
Ethulia conyzoides **L. f.** subsp. conyzoides	Asteraceae	Ann.	Th	PAL	+	+	1.85
Euphorbia helioscopia **L.**	Euphorbiaceae	Ann.	Th	ME+IR-TR+SA-SI	+	-	1.85
E. peplus **L.**	Euphorbiaceae	Ann.	Th	ME+IR-TR+ER-SR	+	-	7.41
Pseudognaphalium luteo album **(L.) Hilliard &B.L. Burtt.**	Asteraceae	Ann.	Th	COSM	+	+	7.41
Halochemum strobilaceum **(Pall).M.Bieb**	Euphorbiaceae	Ann.	Th	ME+IR-TR+ER-SR	-	+	11.11
Hordeum murinum L. subsp. leporinum **(link) Arcang.**	Poaceae	Ann.	Th	ME+IR-TR	-	+	7.41
Ifloga spicata **(Forssk.) Sch. Bip.**	Asteraceae	Ann.	Th	SA-SI	-	+	11.11
Imperata cylindrica **(L.) Raeusch.**	Poaceae	Per.	H	PAL	+	+	31.48
Limbarda crithmoides **(L.) Dumort.**	Asteraceae	Per.	Ch	ME+ER-SR+SA-SI	-	+	7.41
Ipomoea carnea **Jacq**.	Convolvulaceae	Per.	G	PAN	+	-	5.56
Juncus acutus **L.**	Juncaceae	Per.	He	ME+IR-TR+ER-SR	-	+	7.41
J. rigidus **Desf.**	Juncaceae	Per.	G, He	ME+IR-TR+SA-SI	-	+	7.41
J. bufonius **L.**	Juncaceae	Ann	Th	COSM	+	-	1.85
Lactuca serriola **L.**	Asteraceae	Ann.	Th	ME+IR-TR+ER-SR	+	+	5.56
Launaea mucronata **(Forssk.)Muschl.**	Asteraceae	Per.	H	ME+SA-SI	-	+	14.81
Leersia hexandra **Sw.**	Poaceae	Per.	He	PAN	+	+	11.11
Limonium pruinosum **(L.) Chaz.**	Plumbaginaceae	Per.	G, He	SA-SI	-	+	1.85
Lamium amplexicaule **L.**	Labiatae	Ann	Th	ME+IR-TR+ER-SR	+	-	5.56
Lolium perenne **L.**	Poaceae	Per.	Th	ME+IR-TR+ER-SR	+	+	7.41
Lotus polyphyllos **E.D. Clarke**	Fabaceae	Per.	Ch	ME	-	+	12.96
Ludwigia stolonifera	Onagraceae	Per	He.	S-Z	+	+	7.41

(Guill. & Perr.)Raven							
Malva parvifolra **L.**	Malvaceae	Ann.	Th	ME+IR-TR	+	+	27.78
Marsilea aegyptiaca **Willd**	Marsileaceae	Per	H, He	PAL	+	-	3.70
Medicago sativa **L.**	Fabaceae	Per	H	ME+IR-TR+ER-SR	+	-	3.70
Melilotus indicus **(L.)All.**	Fabaceae	Ann.	Th	ME+IR-TR+SA-SI	+	-	11.11
Mentha longifolia **(L.) Muds.**	Labiatae	Per.	He	PAL	+	-	5.56
Mesembryanthemum crystallinum **L.**	Aizoaceae	Ann.	Th	ME+ER-SR	-	+	7.41
M. nodiflorum **L.**	Aizoaceae	Ann.	Th	ME+SA-SI+ER-SR	-	+	1.85
Moltkiopsis ciliata **(Forssk.) I. M. Johnst.**	Boraginaceae	Per	Ch	ME+SA-SI+S-Z	-	+	1.85
Ononis serrata **Forssk**.	Fabaceae	Ann.	Th	ME+SA-SI	-	+	3.70
Pancratium maritimum **L.**	Amaryllidaceae	Per.	G	ME	-	+	1.85
Panicum repens **L.**	Poaceae	Per.	G	PAN	+	+	7.41
Parapholis incurva **(L) C.E.Hubb**	Poaceae	Ann.	Th	ME+IR-TR+ER-SR	-	+	5.56
Paronychia arabica **(L.) DC.**	Caryophyllaceae	Ann.	Th	ME+SA-SI+S-Z	-	+	1.85
Paspalidium geminatum **(Forssk.) Stapf**	Poaceae	Per.	He	PAL	+	+	5.56
Pennisetum setaceum **(Forssk.) Chiov.**	Poaceae	Per.	H	ME+PAL	+	+	5.56
Persicaria lapathifolia **Willd**.	Polygonaceae	Ann.	G	PAL	+	-	1.85
P. salicifolia **(Brouss.ex Willd.)Assenov**	Polygonaceae	Per.	G	PAL	+	+	16.67
Phragmites australis **(Cav.) Trin. ex Steud.**	Poaceae	Per.	G, He	COSM	+	+	48.15
Phyla nodiflora **(L.) Greene**	Verbenaceae	Per	Ch	PAN	+	-	1.85
Picris asplenioides **L.**	Asteraceae	Ann.	Th	ME+IR-TR	-	+	1.85
Plantago squarrosa **Marray**	Plantaginaceae	Ann.	Th	ME	-	+	3.70
P. major **L.**	Plantaginaceae	Per	H	COSM	+	+	9.26
Pluchea dioscridis **(L)DC**	Asteraceae	Per	Nph	SA-SI + S-Z	+	+	22.22
Poa annua **L.**	Poaceae	Ann.	Th	COSM	+	+	9.26
Polygonum equisetiforme **Sibthi & Sm.**	Polygonaceae	Per.	G	ME+IR-TR	+	+	5.56
Polypogon viridis **(Gouan) Brestr.**	Poaceae	Per	H	ME+IR-TR	+	+	11.11
P. monspellensis **(L)Desf**	Poaceae	Ann.	Th	COSM	+	+	9.26
Portulaca oleracea **L.**	Portulacaceae	Ann.	Th	COSM	+	-	1.85
Ranunculus seleratus **L.**	Ranunculaceae	Ann.	Th	ME+IR-TR+ER-SR	+	-	12.96
Raphanus raphanistrum **L.**	Brassicaceae	Ann.	Th	ME+ ER-SR	+	+	3.70
Reichardia tingitana **(L.)Roth.**	Asteraceae	Ann.	Th	ME+IR-TR	-	+	5.56
Rorripa palustris **(L.) Besser**	Brassicaceae	Bi.	Th	ME+IR-TR+ER-SR	+	+	9.26
Rumex pictus **Forssk**.	Polygonaceae	Ann.	Th	ME+SA-SI	-	+	24.07
R. dentatus **L.**	Polygonaceae	Ann.	Th	ME+IR-TR+ER-	+	+	40.74

				SR			
Saccharum spontaneum **L.** var. aegyptiacum **(Willd.) Hackel**	Poaceae	Per.	H	ME+IR-TR+SA-SI	+	+	3.70
Salsola kali **L.**	Chenopodiaceae	Ann.	Th	COSM	-	+	5.56
Suaeda pruinosa **Lange**	Chenopodiaceae	Per	Ch	ME	+	-	1.85
Senecio glaucus **L.**	Asteraceae	Ann.	Th	ME+IR-TR+SA-SI	+	+	33.33
Silene succulenta **Forssk**.	Caryophyllaceae	Per.	H	ME	-	+	12.96
S. vivianii Steud.	Caryophyllaceae	Ann.	Th	SA-SI	-	+	5.56
Silybum marianum **(L.)Gaertn.**	Asteraceae	Per.	H	ME+IR-TR+ER-SR	+	-	3.70
Sisymbrium irio **L.**	Brassicaceae	Ann.	Th	ME+IR-TR+ER-SR	+	+	3.70
Solanum nigrum **L.**	Solanaceae	Ann.	Th	COSM	+	+	7.41
Sonchus oleraceus **L.**	Asteraceae	Ann.	Th	COSM	+	+	29.63
Sorghum virgatum **(Hack.)Stapf**	Poaceae	Per.	G	SA-SI	+	+	7.41
Spergularia marina **(L.) Griseb.**	Caryophyllaceae	Bi.	Th	ME+IR-TR+ ER-SR	-	+	5.56
Sphenopus divaricatus **(Gouan) Rchb.**	Poaceae	Ann.	Th	ME+IR-TR+SA-SI	-	+	3.70
Sporobolus spicatus **(Vahl)Kunth**	Poaceae	Per.	G	ME+SA-SI+S-Z	-	+	5.56
Stellaria pallida **(Dumort.) Murb.**	Caryophyllaceae	Ann.	Th	ME+ER-SR	+	-	3.70
Stipagrostis lanata **(Forssk.) De Winter**	Poaceae	Per.	G	SA-SI	-	+	16.67
S. scoparia **(Trin. & Rupr.) De Winter**	Poaceae	Per.	G	SA-SI	-	+	1.85
Suaeda maritima **(L.) Dumort**	Chenopodiaceae	Ann.	Th	COSM	-	+	1.85
Symphyotrichum squamatum **(spreng) Nesom**	Asteraceae	Per	Ch	NEO	+	+	18.52
Tamarix tetragyna **Ehrenb**.	Tamaricaceae	Per.	Nph	ME+IR-TR+SA-SI	-	+	1.85
T. nilotica **(Ehrenb.) Bunge**	Tamaricaceae	Per.	Nph	SA-SI	+	+	12.96
Torilis arvensis **(Huds.) Link**	Apiaceae	Ann.	Th	ME+IR-TR+ER-SR	+	-	9.26
Typha domingensis **(Pers.) Poir. ex Steud.**	Typhaceae	Per.	He	ME+IR-TR+SA-SI	+	-	9.26
Urospermum picroides **(L.) F.W. Schmidt**	Asteraceae	Ann.	Th	ME+IR-TR	+	+	12.96
Urtica urens **L.**	Urticaceae	Ann.	Th	ME+IR-TR+ER-SR	+	-	5.56
Verbena officinalis **L.**	Verbenaceae	Per.	Ch	COSM	+	-	1.85
Veronica anagallis-aquatica **L**	Plantaginaceae	Per.	He	COSM	+	-	7.41
Vicia sativa **L.**	Fabaceae	Ann.	Th	ME+IR-TR+ER-SR	+	-	3.70
Zygophyllum album **L.**	Zygophyllaceae	Per.	Ch	ME+SA-SI	-	+	5.56
Z. aegyptium **Hosny**	Zygophyllaceae	Per.	Ch	ME	-	+	5.56
Z. coccineum **L.**	Zygophyllaceae	Per.	Ch	SA-SI	-	+	5.56

The presence percentages (ecological wide range of distribution) of the annual species (66) can be categorized as follows:

a) Twenty species have wide range of distribution, being recorded in two habitats, these species include *Rumex dentatus* (P=40.74%), *Senecio glaucus* (P=33.33%),

Sonchus oleraceus (P=29.26%), *Chenopodium murale* (P=29.63%), *Malva parvifolra* (P=27.78%), *Urospermum picroides* and *Eclipta prostrata* (P=12.96%, each) *Poa annua* and *Polypogon monspellensis* (P=9.26%, each), etc.

b) Forty-six species were recorded in one habitat type, among these species with a presence value of are Rumex pictus (P=24.07%), Erodium laciniatum (P=16.67%) Chenopodium album and Ranunculus seleratus (P=12.96%, each), Halochemum strobilaceum, Ifloga spicata and Melilotus indicus (P=11.11%, each).

3.2. Plant Life-Span in the Study Area

Plant species growing in the two habitats of the research region can be categorized into three broad classes based on their duration or life-span: annuals, biennials, and perennials. The overall number of plant species recorded in the research region was 134 taxa, as previously stated. There

were 66 annuals (49.25 percent), 2 biennials (1.49 percent), and 66 perennials among these species (49.25 percent). There were 96 species recorded in the Deltaic Mediterranean coastal desert ecosystem, which were divided into 50 annuals (52.08 percent), 2 biennials (2.08 percent), and 44 perennials (45.83 percent). On the other hand, 84 species

were found in the Canal bank environment, with 41 annuals 48.80 percent), 1 biennial (1.19 percent), and 42 perennials (50.0 percent).

It's worth noting that the plant life-span (duration) in two different habitats of the research region was nearly identical (Table 1). In the Deltaic Mediterranean coastline habitat, the percentage of perennials and annuals was higher than in the Canal bank habitat. The biennial species exhibited variations in the different two selected studied habitats. Two biennials species were recorded in the Deltaic Mediterranean coastal habitat and another one biennial was recorded in the Canal bank habitat (Figure 2).

3.3. Plant Life-Forms in the Study Area

The life-forms of the present study's flora were classified into five types, according to Raunkiaer's (1934) description and categorization of life-forms: Cryptophytes, hemicryptophytes, chamaephytes, and nanophanerophytes are all types of therophytes. The majority of the recorded species were therophytes (50.74%), followed by cryptpphytes (34.68%) and then hemicryptophytes (12.68%), while the chamaephytes attained value of 9.70%. Nanophanerophytes attained the lowest value of life-forms (3.73%) as shown in Table (1) and Figure (2). The percentages of the life-form spectra clearly differed from one environment to the next. The 96 species found in the Deltaic Mediterranean coastal ecosystem can be divided into five groups: therophytes (48.95 percent), cryptophytes (29.41 percent), hemicryptophytes (13.54 percent), chamaephytes (9.37 percent), and nanophaneropytes (9.37 percent) (4.16 percent). In the Canal bank habitat, the recorded species (84) can be classified into the following life forms: therophytes (51.19%), cryptophytes (32.14%), hemicryptophytes (14.28%), chamaephytes (5.95%) and nanophaneropytes .(%3.57)

It is worth to mention that, the life-form spectrum in all habitats of the study area were mainly represented by therophytes and cryptophytes, and partly by hemicryptophytes and chamaephytes. Nanophanerophytes is represented by relatively low values

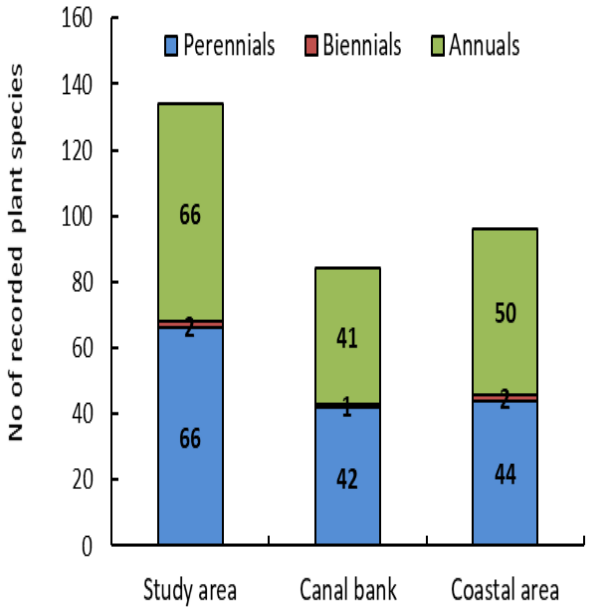

Figure 2. Plant life-span in the study region, and habitats

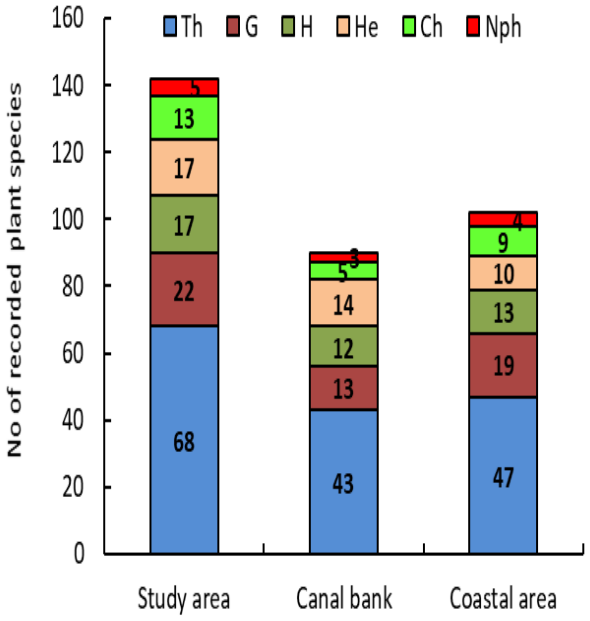

Figure 3. Plant life-form in the study region, and habitats

3.4. The Floristic Analysis of the Study Area

The total number of reported plant species surveyed in this study was 134 species, divided into 113 genera and 35 families. Poaceae has 29 species (21.64 percent) of all documented species, followed by Asteraceae (22 species = 16.41 percent), Chenopodiaceae (10 species = 7.46 percent), and Brassicaceae (7 species = 5.22 percent), according to Table 2. Caryophyllaceae (5 species, or 3.73 percent), Cyperaceae, Fabaceae, and Polygonaceae each had six species (4.47 percent). The remaining families (20) had two or one species to represent them.

The floristic categories of the plant life in the study area is shown in Table (2). The floristic components of the Asteraceae were Bi-regional (8 species), Pluri-regional (4 species), Saharo/Sindian and Cosmopolitan represented by (2 species) and Mediterranean (one species). In Poaceae, the floristic classes were Pluri-regional (7 species), Bi-regional (5species), Cosmopolitan by 4 species and Saharo/Sindian, Mediterranean and Palaeotropical represented by (3 species). In Chenopodiaceae, the chorotypes were Cosmopolitan by 4 species, Bi-regional which represented by 3 species, Pluri-regional by 2 species. The floristic elements in Fabaceae were Pluri-regional by 3 species, Bi-regional (2 species), and Mediterranean by one species. In Caryophyllaceae, were Pluri-regional (2 species): Bi-regional, Saharo/Sindian and Mediterranean one species each. Brassicaceae was represented by 7 species distributed in three floristic elements: Pluri-regional (4 species). Bi-regional (2 species). In Polygonaceae, the floristic categories were Bi-regional (3 species) and Pluri-regional (one species).

Table (4) shows that 76 species (about 56.72 percent of the total number of observed species) were Mediterranean taxa based on the floristic analysis of the study area. Pluri-regional (37 species = 27.61 percent), Bi-regional (27 species = 20.15 percent), and Mono-regional (12 species = 8.96 percent) taxa were present. It has been also found that, the Saharo/Sindian element was highly represented by 40 species (29.85%), which can be subdivided into 9 species (6.72%) as Mono-regional, 15 species (11.19%) as Bi-regional and 16 species (11.94%) as Pluri-regional elements. On the other hand, 41 species or about 30.59% of the total number of recorded species were either Cosmopoliton (18 species = 13.43%), Palaeotropical and Pantropical (10 species = 7.46% each) or Neotropical (3 species = 2.24 %). Another floristic categories were poorly represented, as they were represented by a few number of species

. Table (3) indicated that, the floristic categories were varied from one habitat to another. The highest number of Mediterranean elements (56 species = 58.35%) was recorded in the Deltaic Mediterranean coastal desert habitat. These elements include 22 species (22.92%) of Pluriregional taxa, 23 species (23.97%) of Biregional taxa and 11 species (11.46%) of Monoregional taxa. In the Canal bank habitat, the number of Mediterranean taxa was 37 species (44.04%), these taxa were either Pluriregional (22 species = 26.19%), Biregional (14 species = 16.66%) or Monoregional (one species = 1.19%). Generally, the Cosmopolitan, Palaeotorpical and Neotropical elements were obviously comparable in all habitats of the study area. Another floristic categories were either poorly represented or completely missed in the different habitats

Table 2. The principal chorotype of the families in the study zone.

Family	Genus	Species	COSM	NEO	PAN	PAL	Pluri-regional elements	Bi-regional elements	ME	SA-SI	S-Z	Cult.& Nat.
Poaceae	27	29	4	-	3	3	7	5	3	3	-	1
Asteraceae	22	22	2	3	1	1	4	8	1	2	-	-
Chenopodiaceae	7	10	4	-	-	-	2	3	1	-	-	-
Brassicaceae	7	7					4	2				1
Cyperaceae	1	6			3	1		1	1			
Fabaceae	6	6					3	2	1			
Polygonaceae	4	6				2	1	3				
Caryophyllaceae	4	5					2	1	1	1		
Convolvulaceae	3	3	1		1			1				
Euphorbiaceae	2	3					3					
Juncaceae	1	3	1				2					
Plantaginaceae	2	3	2						1			
Zygophyllaceae	1	3						1	1	1		
Aizoaceae	1	2					1	1				
Amaranthaceae	2	2			1			1				
Apiaceae	2	2					1		1			
Boraginaceae	2	2					1	1				
Labiatae	2	2				1	1					
Tamaricaceae	1	2					1					1
Amaryllidaceae	1	1							1			
Asclepiadaceae	1	1						1				
Geraniaceae	1	1							1			
Malvaceae	1	1						1				
Marsileaceae	1	1				1						
Onagraceae	1	1									1	
Plumbaginaceae	1	1								1		
Portulacaceae	1	1	1									
Primulaceae	1	1	1									
Ranunculaceae	1	1					1					
Solanaceae	1	1	1									
Typhaceae	1	1					1					
Umbelliferae	1	1					1					
Urticaceae	1	1					1					
Verbenaceae	1	1			1							
Verbenaceae	1	1	1									
Total	113	134	18	3	10	9	37	32	13	8	1	3
Percentage			13.4	2.2	7.5	6.72	27.6	23.9	9.7	5.9	0.8	2.2

.

4. Conclusion

Egyptian floristic components may be found in at least four phytogeographical regions: African Sudano/Zambesian, Asian Irano/Turanian, Afro/Asian Sahro/Sindian, and Euro/Afro/Asian Mediterranean. The total number of the recorded plant species surveyed in the present study was 134 species belonging to 113 genera and related to 35 families. Poaceae, Asteraceae, Chenopodiaceae, Brassicaceae are the most leading families. The Deltaic Mediterranean coastal desert environment had the highest number of Mediterranean components. A total of 37 Mediterranean taxa were found in the Canal bank habitat. In general, all ecosystems in the research area had Cosmopolitan, Palaeotorpical, and Neotropical features that were clearly comparable.

Table 3. Number of taxa and ratio of various chorotype in the different environment types of the study zone.

Floristic category	Study area		Canal bank		Coastal area		Geographical distribution
	No.	%	No.	%	No.	%	
COSM	18	13.43	16	19.05	12	12.50	World wide
NEO	3	2.24	3	3.57	3	3.13	
PAN	10	7.46	10	11.90	3	3.13	
PAL	10	7.46	10	11.90	6	6.25	
ME+IR-TR+ER-SR	21	15.67	16	19.05	10	10.42	Pluriregional elements
ME+IR-TR+SA-SI	11	8.21	6	7.14	7	7.29	
ME+ER-SR+SA-SI	2	1.49	-	-	2	2.08	
ME+SA-SI+S-Z	3	2.24	-	-	3	3.13	
ME+IR-TR	11	8.21	8	9.52	9	9.38	Biregional elements
ME+PAL	2	1.49	1	1.19	2	2.08	
ME+SA-SI	10	7.46	2	2.38	9	9.38	
ME+ ER-SR	4	2.99	3	3.57	3	3.13	
IR-TR+SA-SI	3	2.24	2	2.38	3	3.13	
SA-SI + S-Z	2	1.49	1	1.19	2	2.08	
ME	12	8.96	1	1.19	11	11.46	Mono-regional elements
Cult.& Nat.	2	1.49	2	2.38	1	1.04	
SA-SI	9	6.72	2	2.38	9	9.38	
S-Z	1	0.75	1	1.19	1	1.04	
Total	134	100	84	100	96	100	

4. References

1. Zahran, M. A., & Willis, A. J. (2009). The Sinai Peninsula. In The Vegetation of Egypt (pp. 213-249). Springer, Dordrecht.
2. Workman, S.W. and McLeod, K.W. (1990) "Vegetation of the Savannah River Site: major community types (No. SRO-NERP-19)". Savannah River Ecology Lab., Aiken, SC (USA)..
3. Scope. (1972). Man-made lakes as modified ecosystems. SCOPE Working Group on Man-made Lakes. Paris (France): International Council of Scientific Unions.
4. Ludwig, D., Hilborn, R. and Walters, C., (1993). Uncertainty, resource exploitation, and conservation: lessons from history. Ecological applications, pp.548-549.
5. Costanza, R., d'Arge, R., De Groot, R., Farber, S., Grasso, M., Hannon, B., Limburg, K., Naeem, S., O'neill, R.V., Paruelo, J. and Raskin, R.G. , (1997) The value of the world's ecosystem services and natural capital. Nature, vol. **387**, no. 6630, pp. 253-260.
6. Balmford, A., Bruner, A., Cooper, P., Costanza, R., Farber, S., Green, R.E.,
7. Jenkins, M., Jefferiss, P., Jessamy, V., Madden, J. and Munro, K. (2002) "Economic reasons for conserving wild nature". Science, vol. **297,** no. 5583, pp. 950-953,.
8. Boulos, L. (2005). "Flora of Egypt". Vol. 4, All Hadara Publishing, Cairo, Egypt.
9. Täckholm, V. "Students Flora of Egypt. 2nd ed". Cairo. Univ. Press, Egypt. 1974.
10. Raunkięr, C. "Plant life forms". Clarendon Press. 1934-1937.
11. Davis, P. H. (ed.) (1965, 1967, 1970,1972, 1975, 1978, 1982, 1984&1985). Flora of Turkey and the East Agean Islands. Vols. 1,2,3,4,5,6,7,8&9. Edinburgh Univ. Press
12. Zohary, M. Flora Palestine. (1996) Vols. **1&2.** The Israel Academy of Science and Humanities, Jerusalem. and 1972.
13. Meikle, R.D. (1977 & 1985). Flora of Cyprus. Vols. 1 and 2. Bentham-Maxon Trust, Royal Botanic Gardens, Kew.
14. Feinbrun-Dothan, N. (1978&1986). Flora Palaestina. Parts 3&4. The Israel Academy of Sciences and Humanities, Jerusalem.
15. Boulos, L, (1999-2005).. "Flora of Egypt. (Vol. **1-4**). Al Hadara Publishing, Cairo.