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HABITAT AND PLANT LIFE IN EL-DAKAHLYIA GOVERNORATE , EGYPT

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ABSTRACT

The present study provides a detailed description of the floristic and ecological features of the three habitats in El-Dakahlyia Province. These habitats include : Delta Mediterranean coastal belt , cultivated lands and canal banks. The results indicated that, the total number of weeds recorded in the study area is 197 species belonging to 147 genera and related to 47 families. These species include 101 annuals (51.27%) , 7 biennials (3.55%) and 89 perennials (45.18%). Therophytes are the most frequent life –form (53.3%) .The floristic analysis of the study area revealed that, 46.19% of the total number of the recorded species are Mediterranean element. The application of TWIN-SPAN classification based on the importance values of the different species in the three habitats led to the separartion of 12 vegetation groups named after their dominant species. The correlation between the edaphic factors and ordination axes led to the definition of the most effective soil gradients which correlate with the distribution and abundance of the identified vegetation groups in the different habitat types .

Key words : *Weed flora , classification , ordination, soil analysis, Nile Delta*

INTRODUCTION

The Nile Delta is about 22,000 km^2 as compared with 13,000 km^2 for the area of the Nile Valley and comprises about 63% of Egypt's productive area (Abu-Al-Izz, 1971). It's agroecosystem is one of the oldest and most successful in the world, providing one of the few examples of a permanent irrigated agriculture (Stanhill, 1979). The vegetation of this region (excluding the extreme northern part) is mainly weeds associated with the crops in the cultivated lands or ruderal habitats such as the banks of canals and drains, roadsides and railways and wastelands (Shaltout, 1994). El-Hadidi and Fayed (1994) estimated the number of weed species in the Nile Delta which ranges between 248 and 254 species including aquatic, swampy, riverain and arable weed flora. The habit of the weedy species vary from herbs to shrubs, from ephemerals , annuals to perennials, from seed producers to sterile plants, from parasites to autotrophs and from apomicts to out-breeders. This variation is certainly as wide as that among the crops which they invade and the weed assemblages.

The present study aims at the following objectives: 1) Studying the floristic features of the study area to detect the taxonomic and phytogeographical significance of its floristic components in different habitat types. 2) Quantitative assessment of the vegetation structure of weed communities by using multivariate techniques of classification and ordination. 3) Analysis of variations in environ-

mental factors (edaphic) to determine the factors controlling the distribution and abundance of weed communities in the study area.

THE STUDY AREA

El-Dakahlyia Governorate is located in the mid-down stream of the Damietta branch of the River Nile at 30° 50`N - 31° 50`N latitude and 30°E - 32°E longitude to north east of the Nile Delta region of Egypt (Figure 1). The total average area of El-Dakahlyia Governorate is about 3459 km^2 and inhabited by about 5, 306, 322 population. The total agricultural area is about 645, 813 feddans, of this area about 630, 215 feddans is cultivated with orchards. The main field crops in the Governorate are represented by about 30.20% flax, and 6.19% sugar beet. The main summer field crops are represented by rice (44.82%), cotton (11.10%), maize (30.89%). Winter and summer vegetables are represented by about 6.98% of the total area of the Governorate.

The Nile Delta area lies in the arid belt of the southern Mediterranean region. Its climate is rather arid to semi-arid, where the rate of evaporation exceeds many times the precipitation. The climatic average (2004-2006) of El-Dakahlyia Meterological Station (Climatological Normals of Egypt) showed that, the mean annual minimum, maximum and mean air temperature are 14.8, 27.4 and 21.1°C respectively. The mean annual of relative humidity, rainfall and evaporation are 66.7%, 0.12 cm and 4.1 mm/day, respectively.

MATERIALS AND METHODS

The most recognizable habitat types in the study area are the Delta Mediterranean coast, cultivated lands and canal and canal bank habitats. The Deltaic Mediterranean coast is distinguished into two divisions : 1) Coastal belt which can be subdivided into sand dunes, sand flats, salt marshes and sandy fertile lands. 2) The shorelines of the north eastern corner of Lake Manzala. On the other hand, the cultivated land habitats can be divided into : 1) Winter crops comprising clover, wheat, broad bean, flax and winter vegetables. 2) Summer crops comprising rice, cotton, maize and summer vegetables. 3) Orchards comprising citrus, grape and banana. The canal and canal bank habitats may be divided into : 1) Banks of the irrigation and drainage canals. 2) Open water bodies including the main canals and drains.

Seasonal records (winter-spring season and summer-autumn season) of the flora were carried out during regular visits to the study area. During each visit, the floristic elements in the different habitats had been surveyed and the species are recorded. The description and the classification of life forms are according to Raunkiaer (1934). The classification, identification, nomenclature and floristic categories are according to Tutin et al. (1964-1980), Zohary (1966 & 1972), Davis (1965-1985), Tackholm (1974) and Boulos (1999-2005).

Two hundreds and seven stands (area = 1 x 5 m) have been selected for sampling vegetation in the ruderal habitats while other stands (area = 10 x 10 m) have been chosen in the natural habitats. The stands were chosen and distributed to cover all physiographic variations in each habitat type and to ensure sampling of wide range of vegetational variations. The density and plant cover of each species have been estimated in each stand. The densi-

ty was measured by counting the number of individuals of species within each stand (Shukla and Chandel, 1989). The plant cover was estimated by using line-intercept method (Canfield, 1941). Relative values of density and cover were calculated for each species and summed up to give an estimate of its importance value (IV) in each stand which is out of 200.

One soil sample was collected from each stand (from profile 0-50 cm) for physical and chemical analyses. Soil texture was determined using sieve method for the coarse soil, while the heavy textured soil was determined by Bouyoucous hydrometer method (Piper, 1947). The soil porosity and water-holding capacity were determined also according to Piper (1947). Calcium carbonate was determined by titration against 1N NaOH (Jackson, 1962). Oxidizable organic carbon was determined using Walkely and Black rapid titration as mentioned by Piper (1947). Soil solution (1:5) was prepared for determination of other chemical characteristics. Electrical - pH meter with glass electrode was used to determine the soil reaction. Electrical conductivity was expressed as mmhos/cm and measured using YSI Incorporated Model 33 conductivity meter. The estimation of chlorides was carried out by titration method using N/35.5 silver nitrate and potassium chromate solution as indicator (Jackson, 1962). Sulphate content was estimated gravimetrically using 5% barium chloride solution (Piper, 1947). Carbonates and bicarbonates were determined by titration method using 0.1N HCl (Pierce *et al.,* 1958). The total dissolved phosphorus was determined by digestion and followed by direct stannous chloride method (American Public Health Association, 1985). The total soluble nitrogen was determined by the conventional semi-micromodification of Kjeldahl method (Pirie, 1955). The extractable cations Na^{+}, K^{+}, Ca^{++} and Mg^{++} were determined using flame photometer (Allen *et al.,* 1974). The sodium adsorption ratio (SAR) and potassium adsorption ratio (PAR) were calculated according to McKell and Goodin (1984).

Two trends of multivariate analysis namely classification and ordination were applied. Two-Way Indicator Species Analysis (TWINSAN-a FORTRAN Program) was used for classification (Hill, 1979 and Gauch, 1982), while the ordination techniques applied were the Detrended Correspondence Analysis (DCA) and Canonical Correspondence Analysis (CCA) using CANOCO-a FORTRAN Program (ter Break, 1986, 1987 & 1988). The relationships between vegetational gradients and environmental variables can be indicated on the ordination diagram produced by Canonical Correspondence Analysis [CCA -biplot] in which points represent species and arrows represent environmental variables. The statistical treatment applied in the present study were according to Snedecor and Cochran (1968) and Anonymous (1993).

RESULTS

A. Floristic Features

The floristic composition of the plant species in three habitats, namely: Deltaic Mediterranean coast, cultivated land and irrigation and drainage canal habitats are presented in Table (1). The total number of weeds in the study area is 197 species belonging to 147 genera and related to 47 families. Gramineae, Compositae, Chenopodiaceae, Leguminosae,

Table (1) : Floristic composition of different habitat types of the study area.

Species	Life span	Life form	Chorophyte	Habitat types			Presence	Presence Percentage
				D.M.C	Cultivated land	Canal and canal banks		
Adiantum capillus veneris L.	Per.	He	ME+IR-IR+ER-SR	-	+	+	2	66.66
Alhagi graecorum Boiss	Per.	H	PAL	-	-	+	1	33.33
Alternanthera sessilis (L.) DC.	Per.	He	PAN	-	+	+	2	66.66
Amaranthus graecianze L.	Ann.	Th	ME+IR-TR	-	+	-	1	33.33
Amaranthus hybridus L.	Ann.	Th	PAL	-	+	+	2	66.66
Amaranthus lividus L.	Ann.	Th	ME+IR-TR	+	+	+	3	100
Ammania baccifera L.	Ann.	Th	S-Z+IR-TR	-	+	-	1	33.33
Ammania senegalensis Lam.	Ann.	Th	PAN	-	+	-	1	33.33
Ammi majus L.	Ann.	Th	ME+IR-TR+ER-SR	-	+	+	2	66.66
Ammi visnaga (L.)Lam.	Ann.	Th	ME+IR-TR	-	+	-	1	33.33
Anagallis arvensis L.	Ann.	Th	COSM	-	+	+	2	66.66
Anthemis pseudocotula Boiss.	Ann.	Th	ME	-	+	-	1	33.33
Apium graveolens L.	Bi.	Th	ME+IR-TR+ER-SR	-	+	+	2	66.66
Apium leptophylum (Pers.)F.Muell.ex Benth	Per.	Th	COSM	-	+	-	1	33.33
Artemisia monosperma Delile.	Per.	Ch	ME+SA-SI	+	-	-	1	33.33
Arthrocnemum macrostachyum (Moric.) K.Koch.	Per.	Ch	ME+SA-SI	+	-	-	1	33.33
Arundo donax L.	Per.	G,He	CULT and NAT	-	+	+	2	66.66
Asparagus stipularis Forssk.	Per.	G	ME+SA-SI	+	-	-	1	33.33
Atractylis carduus (Forssk.) C.Chr.	Per.	H	ME+SA-SI	+	-	-	1	33.33
Atriplex portulacoides L.	Per.	Ch	ME+IR-TR+ER-SR	+	-	-	1	33.33
Atriplex prostrata DC.	Ann.	Th	ME+IR-TR+ER-SR	+	-	-	1	33.33
Avena fatua L.	Ann.	Th	PAL	-	+	+	2	66.66
Azolla filiculoides Lam.	Ann.	Hy	NEO	-	-	+	1	33.33
Bassia indica (Wight) A.J.Scott.	Ann.	Th	S-Z+IR-TR	+	-	+	2	66.66
Bassia muricata L.	Ann.	Th	SA-SI+IR-TR	+	-	-	1	33.33
Beta vulgaris L.	Bi.	Th	ME+IR-TR+ER-SR	+	+	+	3	100
Bidens pilosa L. var. radiata Sch. Bip.	Ann.	Th	PAN	-	+	-	1	33.33
Bolboschoenus glaucus (Lam.) S.G.Smith	Per.	G	COSM	+	-	-	1	33.33
Brachiaria mutica (Forssk.) Stapf	Per.	H	PAN	-	-	+	1	33.33
Brassica nigra (L.) Koch.	Ann.	Th	COSM	-	+	-	1	33.33
Brassica rapa L.	Ann.	Th	CULT and NAT	-	+	-	1	33.33
Brassica tournefortii Gouan	Ann.	Th	ME+IR-TR+SA-SI	+	+	-	2	66.66
Bromus diandrus Roth.	Ann.	Th	ME	+	-	-	1	33.33
Cakile maritime Scop.	Ann.	Th	ME+ER-SR	+	+	-	2	66.66
Calligonum polygonoides L. subsp. Comosum	Per.	Nph	SA-SI+IR-TR	+	-	-	1	33.33
Capsella bursa-pastoris (L.) Medik.	Ann.	Th	COSM	-	+	+	2	66.66
Centaurea calcitrapa L.	Bi.	Ch	ME+ER-SR	+	-	-	1	33.33
Ceratophyllum demersum L.	Per.	Hy	COSM	-	-	+	1	33.33
Chenopodium album L.	Ann.	Th	COSM	-	+	+	2	66.66
Chenopodium ambrosioides L.	Bi.	Th	COSM	-	-	+	1	33.33
Chenopodium ficifolium Sm.	Ann.	Th	ME+ER-SR	-	+	+	2	66.66
Chenopodium giganteum D.Don	Ann.	Th	SUB COSM	-	+	-	1	33.33
Chenopodium glaucum L.	Ann.	Th	ME+ER-SR	-	+	+	2	66.66
Chenopodium murale L.	Ann.	Th	COSM	-	+	+	2	66.66
Cichorium endivia L.	Ann.	Th	ME+IR-TR	-	+	+	2	66.66
Convolvulus arvensis L.	Per.	H	COSM	-	+	+	2	66.66

Table (1). Continued.

Convolvulus lanatus Vahl.	Per.	Ch	SA-SI	+	-	-	1	33.33
Conyza aegyptiaca (L.) Dryand	Ann.	Th	ME	+	+	+	3	100
Conyza bonariensis (L.) Cronquist, Bull.	Ann.	Th	NEO	+	+	+	3	100
Corchorus olitorius L.	Ann.	Th	PAN	-	+	+	2	66.66
Coronopus didymus (L.) Sm.	Ann.	Th	COSM	-	+	+	2	66.66
Coronopus squamatus (Forssk.) Anch.	Ann.	Th	ER-SR+IR-TR+ME	-	+	+	2	66.66
Cressa cretica L.	Per.	H	ME+PAL	+	-	+	2	66.66
Cuscuta pedicellata Ledeb.	Ann.	P	S-Z+SA-SI+IR-TR	-	+	+	2	66.66
Cutandia memphitica (Spreng.) Benth.	Ann.	Th	ME+IR-TR+SA-SI	+	-	-	1	33.33
Cynanchum acutum L.	Per.	H	ME+IR-TR	+	+	+	3	100
Cynodon dactylon (L.) Pers.	Per.	G	PAN	+	+	+	3	100
Cyperus alopecuroides Rottb.	Per.	He	PAN	-	+	+	2	66.66
Cyperus articulatus L.	Per.	G,He	PAN	-	-	+	1	33.33
Cyperus capitatus Vand.	Per.	G	ME	+	-	-	1	33.33
Cyperus conglomeratus Rottb.	Per.	G	SA-SI+S-Z	+	-	-	1	33.33
Cyperus difformis L.	Ann.	Th	PAL	-	+	+	2	66.66
Cyperus laevigatus L.	Per.	G,He	PAN	-	-	+	1	33.33
Cyperus rotundus L.	Per.	G	PAN	+	+	+	3	100
Dactyloctenium aegyptium (L.) Willd.	Ann.	Th	PAL	-	+	-	1	33.33
Datura innoxia Mill.	Ann.	Th	NEO	-	-	+	1	33.33
Datura stramonium L.	Ann.	Th	NEO	-	-	+	1	33.33
Desmostachya bipinnata (L.) Stapf .	Per.	G,H	S-Z+ME+SA-SI+IR-TR	-	+	+	2	66.66
Digitaria sanguinalis (L.) Scop.	Ann.	Th	PAL	-	+	+	2	66.66
Dinebra retroflexa (Vahl) Panz.	Ann.	Th	S-Z+SA-SI	-	+	+	2	66.66
Echinochloa colona (L.) Link	Ann.	Th	PAN	-	+	+	2	66.66
Echinochloa crus-galli (L.) P. Beauv.	Ann.	Th	PAN	-	+	+	2	66.66
Echinochloa stagnina (Retz.) P. Beauv.	Per.	G,He	PAL	+	-	+	2	66.66
Echinops spinosus L.	Per.	H	ME+SA-SI	+	-	-	1	33.33
Eclipta prostrata (L.) L.	Ann.	Th	NEO	-	+	+	2	66.66
Eichhornia crassipes (C. Mart.) Solms.	Per.	Hy	NEO	+	-	+	2	66.66
Eleusine indica L.	Ann.	Th	PAL	-	+	-	1	33.33
Elymus farctus (Viv.) Ranemark ex.Melderis.	Per.	G	ME	+	-	-	1	33.33
Erodium laciniatum (Cav.) Willd.	Ann.	Th	ME	+	-	-	1	33.33
Eruca sativa L. subspecies arvensis	Ann.	Th	CULT and NAT	-	+	-	1	33.33
Ethulia conyzoides L.F.	Ann.	Th	PAL	-	-	+	1	33.33
Euphorbia helioscopia L.	Ann.	Th	ME+IR-TR+SA-SI	-	+	-	1	33.33
Euphorbia heterophylla L.	Ann.	Th	PAN	-	+	-	1	33.33
Euphorbia hirta L.	Per.	H	ME	-	+	-	1	33.33
Euphorbia peplus L.	Ann.	Th	ME+IR-TR+ER-SR	-	+	+	2	66.66
Euphorbia prostrata Aiton.	Ann.	Th	PAN	-	+	-	1	33.33
Halocnemum strobilaceum (Pallas) M. Bieb.	Per.	Ch	ME+IR-TR+SA-SR	+	-	-	1	33.33
Myriophyllum spicatum L.	Per.	Hy	SUB COSM	-	-	+	1	33.33
Heliotropium curassavicum L.	Per.	Ch	NEO	+	-	+	2	66.66
Hibiscus trionum L.	Ann.	Th	PAL	-	+	+	2	66.66
Hordeum murinum L.	Ann.	Th	ME+IR-TR+ER-SR	-	-	+	1	33.33
Ifloga spicata (Forssk.) Sch. Bip.	Ann.	Th	ME+SA-SI	+	-	-	1	33.33
Imperata cylindrica (L.) Raeusch.	Per.	H	ME+PAL	-	+	+	2	66.66
Ipomoea carnea Jacq.	Per.	G	PAN	-	-	+	1	66.66
Juncus acutus L.	Per.	He	ME+IR-TR+ER-SR	+	-	-	1	33.33
Juncus rigidus Desf.	Per.	G,He	ME+SA-SI+IR-TR	+	-	-	1	33.33
Juncus subulatus Forssk.	Per.	G,He	ME+IR-TR+SA-SR	+	-	-	1	33.33
Lactuca serriola L.	Ann.	Th	ME+IR-TR+ER-SR	-	+	+	2	66.66
Lamium amplexicaule L.	Ann.	Th	ME+IR-TR+ER-SR	-	+	+	2	66.66
Lathyrus aphaca L.	Ann.	Th	ME+IR-TR+ER-SR	-	-	+	1	33.33
Lathyrus hirsutus L.	Ann.	Th	ME+IR-TR+ER-SR	-	+	-	1	33.33

Table (1). Continued.

Launaea mucronata (Forrsk.) Muschle.	Per.	H	ME+SA-SI	+	-	-	1	33.33
Leersia hexandra Sw.	Per.	He	PAN	-	+	+	2	66.66
Lemna gibba L.	Per.	Hy	COSM	-	-	+	1	33.33
Lepidum sativum L.	Ann.	Th	ME	-	+	-	1	33.33
Leptochloa fusca (L.) Kunth.	Per.	G,He	PAN	-	+	+	2	66.66
Limbarda crithmoides (L.) Dumort.	Per.	Ch	ME+ER-SR+SA-SI	+	+	+	3	100
Limoniastrum monopetalum L.	Per.	Ch	ME	+	-	-	1	33.33
Lolium perenne L.	Per.	Th	ME+IR-TR+ER-SR	-	+	+	2	66.66
Lolium temulentum L.	Ann.	Th	ME+IR-TR+ER-SR	-	+	-	1	33.33
Lotus creticus L.	Per.	H	ME	+	-	-	1	33.33
Lotus glaber Mill	Per.	H	ME+IR-TR+ER-SR	-	+	+	2	66.66
Lotus halophilus Boiss.	Ann.	Th	ME+SA-SI	+	-	-	1	33.33
Ludwigia stolonifera (Guill. et Perr.) Raven	Per.	He	S-Z	-	-	+	1	33.33
Lycium schweinfurthii Dammer	Per.	Nph	ME	+	-	-	1	33.33
Malva parviflora L.	Ann.	Th	ME+IR-TR	-	+	+	2	66.66
Medicago intertexta L.	Ann.	Th	ME+ER-SR	-	+	+	2	66.66
Medicago polymorpha L.	Ann.	Th	COSM	-	+	+	2	66.66
Medicago sativa L.	Per.	H	ME+IR-TR+ER-SR	-	+	+	2	66.66
Melilotus indicus (L.) *All.*	Ann.	Th	ME+IR-TR+SA-SI	+	+	+	3	100
Mentha longifolia (L.) *Huds.*	Per.	Hr	PAL	-	+	+	2	66.66
Mesembryanthemum crystallinum L.	Ann.	Th	ME+ER-SR	+	-	-	1	33.33
Mesembryanthemum nodiflorum L.	Ann.	Th	ME+SA-SI+ER-SR	+	-	-	1	33.33
Nicotiana glauca R.C. Graham	Per.	Ch	CULT and NAT	-	-	+	1	33.33
Nymphaea lotus L..	Per.	Hy	PAL	-	-	+	1	33.33
Orobanche crenata Forssk.	Ann.	P	ME+IR-TR	-	+	-	1	33.33
Oxalis corniculata	Per.	H	COSM	-	+	+	2	66.66
Panicum repens L.	Per.	G	PAN	+	+	+	3	100
Paspalidium geminatum (Forssk.) Stapf.	Per.	He	PAL	-	+	+	2	66.66
Paspalum distichum L.	Per.	G	PAN	-	+	+	2	66.66
Pennisetum glaucum (L.) R.Br.	Per.	H	ME+PAL	-	+	+	2	66.66
Pennisetum setaceum (L.) R.Br.	Per.	H	ME+PAL	-	+	+	2	66.66
Persicaria lapathifolia Willd.	Per.	G	PAL	-	-	+	1	33.33
Persicaria salicifolia Brouss. ex Willd.	Per.	G	PAL	+	+	+	3	100
*Persicaria senegalensis (*meisn) Sojak	Per.	G	PAL	-	-	+	1	33.33
Phalaris minor Retz.	Ann.	Th	ME+IR-TR	-	+	+	2	66.66
Phragmites australis (Cuv.) Trin. ex Steud.	Per.	G,He	COSM	+	+	+	3	100
Phyla nodiflora (L.) Greene	Per.	Ch	PAN	-	+	+	2	66.66
Pistia stratiotes L.	Per.	Hy	PAN	-	-	+	1	33.33
Plantago major L.	Per.	H	COSM	-	+	+	2	66.66
Pluchea dioscoridis (L.) DC.	Per.	Nph	S-Z+SA-SI	+	+	+	3	100
Poa annua L.	Ann.	Th	COSM	-	+	+	2	66.66
Polygonum equisetiforme Sibthi & Sm.	Per.	G	ME+IR-TR	+	-	+	2	66.66
Polypogon monspeliensis (L.) Desf.	Ann.	Th	COSM	+	+	+	3	100
Polypogon viridis (Gouan) Breistr.	Per.	H	ME+IR-TR	-	+	+	2	66.66
Portulaca oleracea L.	Ann	Th	COSM	-	+	+	2	66.66
Potamogeton crispus L.	Per.	Hy	COSM	-	-	+	1	33.33
Potamogeton pectinatus L.	Per.	Hy	COSM	-	-	+	1	33.33
*Pseudognaphalium luteo-album (*L.) Hilliard	Ann.	Th	COSM	-	+	+	2	66.66
Ranunculus sceleratus L.	Ann.	Th	ME+IR-TR+ER-SR	-	+	+	2	66.66
Raphanus raphanistrum L.	Ann.	Th	ME+ER-SR	-	+	-	1	33.33
Retama raetam (Forssk.)Webb	Per.	Nph	SA-SI+IR-TR+ME	+	-	-	1	33.33
Ricinus communis L.	Per.	Nph	CULT and NAT	-	-	+	1	33.33
Rorripa palustris (L.) Besser	Bi.	Th	ER-SR+IR-TR+ME	-	+	+	2	66.66
Rumex dentatus L.	Ann.	Th	ME+IR-TR+ER-SR	+	+	+	3	100
Rumex pictus Forssk.	Ann.	Th	ME+SA-SI	+	-	-	1	33.33

Table (1). Continued.

Saccharum spontaneum L.	Per.	G,He	ME+PAL	-	-	+	1	33.33
Salsola kali L.	Ann.	Th	COSM	+	-	-	1	33.33
Schismus barbatus L.	Ann.	Th	ME+IR-TR+SA-SI	+	-	+	2	66.66
Schoenoplectus litoralis (Schrad.) Palla.	Per.	G	ME+PAL	+	-	+	2	66.66
Senecio aegyptius L.	Ann.	Th	ME+IR-TR+ER-SR	-	+	+	2	66.66
Senecio glaucus L.	Ann.	Th	ME+SA-SI+IR-TR	+	+	-	2	66.66
Senecio vulgaris L.	Ann.	Th	ME+IR-TR+ER-SR	-	-	+	1	33.33
Sesbania sericea (Willd.) Link	Ann.	Th	PAL	-	+	+	2	66.66
Setaria verticillata (L.) P. Beauv.	Ann.	Th	COSM	-	+	+	2	66.66
Setaria viridis (L.) Beauv.	Ann.	Th	PAL	-	+	+	2	66.66
Sida alba L.	Bi.	Th	PAN	-	+	-	1	33.33
Silene rubella L.	Ann.	Th	PAL	-	+	-	1	33.33
Silybum marianum (L.) Gaertn.	Ann.	H	ME+IR-TR+ER-SR	-	+	+	2	66.66
Sinapis arvensis L.	Ann.	Th	COSM	-	+	-	1	33.33
Sisymbrium irio L.	Ann.	Th	ME+IR-TR+ER-SR	-	+	+	2	66.66
Solanum nigrum L.	Ann.	Th	COSM	-	+	+	2	66.66
Sonchus macrocarpus Boulos & C. Jeffrey	Per.	Ch	Egypt (Endomic)	-	+	-	1	33.33
Sonchus oleraceus L.	Ann.	Th	COSM	+	+	+	3	100
Sorghum virgatum (Hack.) Stapf.	Per.	G	SA-SI	-	+	+	2	66.66
Spergularia marina (L.) Griseb	Bi.	Th	ME+IR-TR+ER-SR	+	+	-	2	66.66
Sporobolus pungens (Schreb.) Kunth.	Per.	G	PAN	+	-	-	1	33.33
Stellaria pallida (Dumort.) Murb.	Ann.	Th	ME+ER-SR	-	+	-	1	33.33
Stipagrostis lanata (Forssk.) De Winder	Per.	G	SA-SI	+	-	-	1	33.33
Stipagrostis scoparia (Trin.& Rupr.) Winter	Per.	G	SA-SI	+	-	-	1	33.33
Suaeda maritima (L.) Dumort	Ann.	Th	COSM	+	-	-	1	33.33
Suaeda vera Forssk. ex J.F. Gmel.	Per.	Ch	ME+SA-SI+ER-SR	+	-	-	1	33.33
Symphyotrichum squamatum (Spreng.) Nesom	Per.	Ch	NEO	+	+	+	3	100
Tamarix nilotica (Ehrenb). Bunge	Per.	Nph	SA-SI+S-Z	+	-	-	1	33.33
Torilis arvensis (Huds) Link	Ann.	Th	ME+IR-TR+ER-SR	-	+	+	2	66.66
Trifolium resupinatum L.	Ann.	Th	ME+IR-TR+ER-SR	+	+	+	3	100
Typha domingensis (Pers.) Poir ex Steud.	Per.	He	PAN	+	+	+	3	100
Urospermum picroides (L.) F.W. Schmidt	Ann.	Th	ME+IR-TR	-	+	+	2	66.66
Urtica urens L.	Ann.	Th	ME+IR-TR+ER-SR	-	+	+	2	66.66
Verbena supine L.	Ann.	Th	IR-TR+SA-SI	-	-	+	1	33.33
Veronica anagallis-aquatica L.	Per.	He	COSM	-	+	+	2	66.66
Vicia monantha Retz.	Ann.	Th	ME+ER-SR	-	+	-	1	33.33
Vicia sativa L.	Ann.	Th	ME+IR-TR+ER-SR	-	+	+	2	66.66
Vigna luteola (Jacq.) Benth	Per.	H	PAL	-	-	+	1	33.33
Withania somnifera L.	Per.	Ch	SA-SI+S-Z	-	-	+	1	33.33
Xanthium strumarium L.	Ann.	Th	COSM	-	+	-	1	33.33
Zygophyllum aegyptium Hosny	Per.	Ch	ME	+	-	-	1	33.33

General abbreviation of the present study: Life-span

1- Ann. : Annuals
2- Bi. : Biennials
3- Per. : Perennials

Life-form

1- Th : Therophytes
2- Ch : Chamaephytes
3- NPh : Nanophanerophytes
4- H : Hemicryptophytes
5- He : Helophytes
6- G : Geophytes
7- P : Parasites

Floristic Category

1- COSM : Cosmopolitan
2- PAN : Pantropical
3- PAL : Palaeotropical
4- NEO : Neotropical
5- ME : Mediterranean
6- ER-SR : Euro-Siberian
7- SA-SI : Saharo-Sindian
8- IR-TR : Irano-Turanina
9- S-Z : Sudano-Zambezian
10- NAT & Cult : Naturalized & Cultivated
11- AUS : Australian

Cruciferae and Cyperaceae are the main families and representing collectively about 60.4% of the total number of recorded species in the study area. According to the life-span, the recorded weed flora can be classified under three categories as follows: 101 annual species (51.27%), 7 biennial species (3.55%) and 89 perennials species (45.18%). The present study indicated that, therophytes are the most frequent life-form in the different habitats of the study area. It represented by 105 species (53.3%). The other life-form spectra are geophytes (12.18%), hemicryptophytes (10.15%), chamaephytes (8.12%), helophytes (6.6%), hydrophytes (4.60%), nanophanerophytes (3.04%) and parasites (1.01%). The floristic analysis of the study area revealed that, 91 species (46.19%) of the total number of recorded species are Mediterranean taxa, these taxa are either Pluriregional (22.33%), Biregional (17.76%) and Monoregional (6.09%). The other major chorotypes are Cosmopolitan (16.23%), Pantropical (12.69%), Palaeotropical (10.15%), and Neotropical elements (4.06%). The recorded plant species in the present study have different ranges of distribution. Nineteen species (9.64%) have a wide ecological amplitude, where they recorded in the three habitats (P = 100%). Eighty one species (41.12%) have a moderate ecological amplitude which recorded in two habitats (P=66.66%). On the other hand 97 species have a narrow range of distribution which recorded in one habitat (P=33.33%).

B. Vegetation Analysis

1. Classification of sampled stands

The dendogram resulting from the application of TWINSPAN classification based on the importance values of 67 plant species recorded in 35 sampled stands in the Deltaic Mediterranean coastal habitat led to the recognition of four vegetation groups (Figure 2a and Table 2). Group A comprises 3 stands dominated by *Cynanchum acutum* (IV = 62.29), group B comprises 12 stands dominated by *Arthrocnemum macrostachyum* (IV = 40.90), group C comprises 3 stands dominated by *Halocnemum strobilaceum* (IV = 45.07) and group D comprises 17 stands dominated by *Phragmites australis* (IV = 37.62). The dendrogram resulting from the application of TWINSPAN classification based on the importance values of 102 plant species recorded in 100 sampled stands representing the cultivated land habitat led to the recognition of four vegetation groups (Figure 2b and Table 3). Group A comprises 19 stands dominated by P*olypogon monspeliensis* (IV = 30.89), group B comprises 19 stands dominated by *Sonchus oleraceus* (IV = 20.04), group C comprises 53 stands (dominated by *Echinochloa colona* (IV 39.42) and group D comprises 9 stands dominated by *Echinochloa crus-galli* (IV = 99.76). The classification of stands in the irrigation and drainage canal habitat (96 plant species recorded in 72 sampled stands) indicated the distinction of four groups (Figure 2c and Table 4). Group A comprises 6 stands dominated by *Eichhornia crassipes* (IV = 56.21), group B comprises 10 stands dominated by *Echinochloa colona* (IV = 40.65), group C comprises 29 stands dominated by *Echinochloa colona* (IV = 38.53) and group D comprises 27 stands dominated by *Oxalis corniculata* (IV = 21.96).

2. Ordination of sampled stands

The ordination of sampled stands in all habitats of the study area were applied using

Table (2). Mean and coefficient of variation (value between brackets) of the importance values (out of 200) of recorded species in the different vegetation groups resulting from the TWINSPAN classification of the sampling stands in the Deltaic Mediterranean coastal habitat .

Species	Vegetation group			
	A	B	C	D
1.*Amaranthus lividus* L.	0.30(4.15)	-	-	-
2. *Arthrocnemum macrostachyum*(Moric.) K. Koch	10.07(2.40)	40.90(0.94)	33.78(0.91)	-
3. *Artemisia monosperma* (Delile)	-	0.68(3.45)	-	-
4. *Asparagus stipularis* (Forssk.)	-	0.11(3.45)	-	-
5. *Atraclytis cardus* (Forssk.) C. Chr	-	0.11(3.39)	-	-
6. *Atriplex portulacoides* L.	-	-	-	18.25(1.51)
7. *Atriplex prostrata* DC.	-	-	-	0.07(4.40)
8. *Bassia indica* (Wight) A.J. Scott	3.03(1.73)	-	-	-
9. *Beta vulgaris* L.	-	-	-	0.30(4.12)
10. *Bolboschoenus glaucus* (Lam.) S.G. Smith	-	-	-	0.80(2.32)
11. *Brassica tournefortii* Gouan	-	2.33(1.99)	-	-
12. *Bromus diandrus* Roth	-	0.31(3.51)	-	-
13. *Cakile maritima* Scop.	0.53(1.72)	11.35(1.67)	-	-
14. *Calligonum polygonoides* L.	-	10.38(1.39)	-	-
15. *Centaurea calcitrapa* L.	-	0.62(3.44)	-	-
16. *Convolvulus lanatus* Vahl.	-	2.35(3.46)	-	-
17. *Conyza aegyptiaca* (L.) Dryand	36.17(0.72)	-	-	-
18. *Conyza bonariensis* (L.) Cronquist	-	1.42(3.47)	-	-
19. *Cressa cretica* L.	-	0.15(3.43)	-	-
20. *Cutandia memphitica* (Spreng.) K. Richt	-	6.93(2.43)	-	-
21. *Cynanchum acutum* L.	62.29(0.94)	-	-	-
22. *Cynodon dactylon*. (l.) Pers	-	8.59(2.76)	5.01(1.73)	-
23. *Cyperus conglomeratus* Rottb.	-	5.57(2.85)	-	-
24. *Cyperus rotundus* L.	-	0.30(3.49)	-	-
25. *Echinochloa stagnina* (Retz.) P. Beauv	-	-	-	0.75(3.98)
26. *Echinops spinosus* L.	-	9.13(1.58)	-	-
27. *Eichhornia crassipes* (C. Mart.) Solms	-	-	-	1.37(3.21)
28. *Elymus farctus* (Viv.) Ranemark ex. Melderis.	22.96(0.64)	0.98(3.11)	-	-
29. *Erodium laciniatum* (Cav.) Willd. subsp. laciniatum	-	1.41(2.63)	-	-
30. *Halocnemum strobilaceum* (Pall.) M. Bieb	-	0.33(3.49)	45.07(0.21)	0.07(3.92)
31. *Heliotropium curassavicum* L.	41.90(1.73)	-	-	-
32. *Juncus acutus* L.	-	-	-	4.21(3.51)
33. *Juncus rigidus* Desf.	-	-	29.33(1.73)	18.00(1.79)
34. *Juncus subulatus* Forssk.	-	-	-	0.06(4.08)
35. *Launaea fragilis* (Asso) Pau	-	29.21(1.06)	-	-
36. *Limbarda crithmoides* (L.) Dumont.	0.70(1.74)	-	1.32(1.73)	14.92(1.64)
37. *Limoniastrum monopetalum* L.	-	-	16.50(1.13)	-
38. *Lotus creticus* L	-	0.54(3.47)	-	-
39. *Lycium schweinfurthii* Dammer	-	12.19(3.46)	-	-
40. *Melilotus indicus* (L.) All.	-	0.04(3.46)	-	-
41. *Mesembryanthemum crystallinum* L.	-	2.08(3.28)	-	-
42. *Mesembryanthemum nodiflorum* L.	-	6.94(2.41)	-	-
43. *Panicum repens* L.	-	-	-	3.00(2.59)
44. *Persicaria salicifolia* (Willd.) Assenov	-	-	-	1.26(4.12)
45. *Phragmites australis* (Cav.) Trin. ex steud	-	0.59(2.66)	13.79(1.73)	37.62(0.98)
46. *Pluchea dioscoridis* (L.) DC.	-	4.46(3.46)	-	5.14(1.89)

Table (2). Continued.

47. *Polygonum equisetiforme* Sm.	-	1.45(2.49)	-	-
48. *Polypogon monspeliensis* (L.) Desf.	-	0.04(3.46)	-	-
49. *Retama raetam* (Forssk.)	-	0.86(3.47)	-	-
50. *Rumex dentatus* L.	0.51(1.72)	-	-	-
51. *Rumex pictus* Forssk.	-	13.17(1.91)	-	0.93(2.93)
52. *Salsola kali* L.	3.90(1.20)	0.43(3.46)	-	-
53. *Schismus barbatus* (L.)	0.15(1.73)	-	-	-
54. *Schoenoplectus litoralis* Schard.	-	-	-	1.58(3.30)
55. *Senecio glaucus* L.	1.82(1.74)	0.39(3.43)	-	-
56. *Sonchus oleraceus* L.	0.30(0.88)	-	-	-
57. *Spergularia marina* (L.) Griseb	-	-	-	0.16(4.02)
58. *Sporobolus pungens* (Schreb) kunth	-	7.12(3.46)	6.60(1.73)	-
59. *Stipagrostis lanata* (Forssk.) de Winter	-	27.11(1.45)	-	-
60. *Stipagrostis scoparia* (Trin.& Rupr.)	0.66(3.46)	-	-	-
61. *Suaeda maritima* (L.) Dumort.	14.52(1.73)	-	-	-
62. *Suaeda vera* Forssk. ex J.F. Gmel.	-	1.87(3.47)	19.43(1.47)	-
63. *Symphyotrichum squamatum* (Spreng) Nesom	-	0.03(3.66)	-	-
64. *Tamarix nilotica* (Ehrenb.) Bunge	1.34(1.73)	3.11(3.34)	22.28(0.90)	23.28(1.05)
65. *Trifolium resupinatum* L.	-	0.20(3.38)	-	-
66. *Typha domingensis* (Pers.) Poir. ex Steud	-	-	27.05(1.62)	-
67. *Zygophyllum aegyptium* Hosny	9.89(1.27)	14.39(2.83)	6.86(1.73)	0.06(3.88)

Table (3). Mean and coefficient of variation (value between brackets) of the importance values (out of 200) of recorded species in the different vegetation groups resulting from the TWINSPAN classification of the sampling stands of the cultivated land habitat .

Species	Vegetation group			
	A	B	C	D
1. *Alternanthera sessilis* (L.) DC.	-	-	0.15(5.66)	12.61(1.03)
2. *Amaranthus graecianze* L.	-	-	0.03(6.46)	-
3. *Amaranthus hybridus* L.	-	0.20(3.06)	0.12(5.24)	-
4. *Amaranthus lividus* L.	2.06(3.44)	15.79(1.74)	7.53(2.28)	-
5. *Ammania senegalensis* Lam.	-	-	-	0.76(2.99)
6. *Ammi majus* L.	1.47(4.37)	-	-	-
7. *Ammi visnaga* (L.)Lam.	-	0.20(4.46)	-	-
8. *Anagallis arvensis* L.	20.75(0.91)	2.78(3.07)	0.07(7.20)	-
9. *Apium graveolens* L.	-	0.31(4.36)	-	-
10. *Avena fatua* L.	0.51(4.34)	-	-	-
11. *Beta vulgaris* L.	23.55(1.00)	4.16(2.23)	-	-
12. *Bidens pilosa* L. var.radiata Sch.Bip.	-	7.86(4.36)	7.90(3.50)	-
13. *Brassica nigra* (L.) Koch.	-	0.19(3.04)	-	-
14. *Brassica rapa* L.	0.35(4.38)	2.64(2.59)	-	-
15. *Brassica tournefortii* Gouan	-	0.78(4.33)	-	-
16. *Capsella bursa- pastoris* L.	-	-	0.04(5.18)	-
17. *Chenopodium album* L.	12.90(1.31)	4.17(2.20)	0.18(4.78)	-
18. *Chenopodium ficifolium* Sm.	-	4.31(4.36)	-	-
19. *Chenopodium giganteum* D.Don	0.37(4.41)	-	-	-
20. *Chenopodium glaucum* L.	-	6.86(4.36)	-	-
21. *Chenopodium murale* L.	8.08(2.79)	11.31(3.09)	0.66(3.16)	-
22. *Cichorium endivia* L.	0.35(4.38)	14.16(1.52)	-	-
23. *Convolvulus arvensis* L.	-	0.21(3.13)	1.03(3.26)	-
24. *Conyza aegyptiaca* (L.) Dryand	-	0.56(3.09)	0.73(4.19)	-
25. *Conyza bonariensis* (L.) Cronquiskt	0.36(4.35)	0.16(4.32)	0.60(4.79)	-
26. *Corchorus olitorius* L.	-	-	9.69(1.93)	0.30(3.00)
27. *Coronopus didymus* (L.) Sm.	1.11(4.35)	-	-	-
28. *Coronopus squamatus* (Forssk.)	0.07(4.26)	5.90(1.87)	-	-
29. *Cuscuta pedicellata* Ledeb.	-	2.80(3.01)	-	-
30. *Cynodon dactylon* (L.) Pers.	-	0.31(4.36)	2.47(2.22)	-
31. *Cyperus alopecuroides* Rottb.	-	-	0.20(7.24)	-
32. *Cyperus difformis* L.	-	-	0.19(7.16)	50.42(0.72)
33. *Cyperus rotundus* L.	1.94(4.35)	2.76(2.98)	12.90(1.77)	2.47(2.00)
34. *Dactyloctenium aegyptium* L.	-	-	0.62(4.37)	-
35. *Desmostachya bipinnata* (L.) Stapf.	-	-	0.54(5.22)	-
36. *Digitaria sanguinalis* (L.) Scop	-	-	8.25(2.54)	-
37. *Dinebra retroflexa* (Vahl) Panz.	-	-	18.70(1.43)	4.35(3.00)
38. *Echinochloa colona* (L.) Link	1.70(4.37)	1.87(2.49)	39.42(0.91)	11.62(2.89)
39. *Echinochloa crus-galli* (L.) P. Beauv.	0.29(4.40)	2.01(4.37)	19.39(1.92)	99.76(0.50)
40. *Eclipta prostrate* (L.) Hassk.	-	-	0.51(5.78)	1.03(2.14)
41. *Eleusine indica* L.	-	-	0.73(4.46)	-
42. *Eruca sativa* L. subspecies *arvensis*	0.25(4.40)	-	-	-
43. *Euphorbia heterophylla* L.	-	0.33(4.31)	6.90(2.36)	-
44. *Euphorbia hirta* L.	-	-	0.21(7.21)	-
45. *Euphorbia peplus* L.	-	-	0.62(6.04)	-
46. *Euphorbia prostrata* Aiton.	-	-	0.13(7.05)	-
47. *Hibiscus trionum* L.	-	-	1.06(4.00)	-
48. *Imperata cylindrica* (L.) Raeusch.	-	-	1.43(5.10)	-
49. *Lactuca serriola* L.	1.75(4.37)	-	-	-
50. *Lamium amplexicaule* L.	0.34(4.33)	-	-	-
51. *Lathyrus aphaca* L.	4.47(4.03)	-	0.05(7.44)	-
52. *Lathyrus hirsutus* L	0.28(4.33)	-	-	-

Table (3). Continued.

53. *Leersia hexandra* Sw.	-	-	2.07(4.62)	4.02(1.53)
54. *Lepidum sativum* L.	-	0.52(4.36)	-	-
55. *Leptochloa fusca* (L.) Kunth.	-	-	1.43(4.37)	-
56. *Lolium perenne* L.	1.91(3.31)	0.31(4.36)	-	-
57. *Lotus glaber* Mill.	2.83(4.36)	-	-	-
58. *Malva parviflora* L.	0.25(4.28)	0.99(4.34)	0.07(7.46)	-
59. *Medicago intertexta* L.	16.32(1.61)	0.58(4.39)	-	-
60. *Medicago polymorpha* L.	0.12(4.40)	-	-	-
61. *Medicago sativa* L.	0.65(4.34)	2.30(3.89)	-	-
62. *Melilotus indicus* (L.) All.	6.90(1.66)	9.10(1.42)	0.03(6.68)	-
63. *Mentha longifolia* (L.) Huds	0.23(4.30)	4.75(3.45)	0.44(5.51)	-
64. *Orobanche crenata* Forssk.	-	0.21(4.41)	-	-
65. *Oxalis corniculata* L.	0.23(4.38)	-	1.71(3.79)	-
66. *Panicum repens* L.	-	-	0.12(5.66)	-
67. *Paspalidium geminatum* (Forssk.) Stapf.	-	-	1.31(4.31)	-
68. *Paspalum distichum* L.	0.50(3.05)	-	4.43(2.91)	1.25(3.00)
69. *Pennisetum setaceum* (L.) R.Br.	-	-	0.15(7.28)	-
70. *Persicaria salicifolia* (Willd) Assenov	-	-	1.85(6.68)	-
71. *Phalaris minor* Retz.	7.29(2.24)	-	-	-
72. *Phyla nodiflora* (L.) Greene	0.25(4.38)	-	0.23(5.22)	-
73. *Plantago major* L.	1.13(4.35)	4.75(2.17)	0.16(7.43)	-
74. *Pluchea dioscoridis* (L.) DC	-	-	0.72(4.14)	-
75. *Poa annua* L.	-	-	1.24(3.29)	5.24(1.52)
76. *Polypogon monspeliensis* (L.) Desf	30.89(1.21)	16.53(1.43)	4.08(3.44)	-
77. *Polypogon viridis*(Gouan) Breistr.	0.73(4.33)	14.28(2.33)	-	-
78. *Portulaca oleracea* L.	3.20(4.36)	0.68(3.94)	20.45(1.24)	-
79. *Ranunculus sceleratus* L.	2.82(2.63)	1.25(3.42)	-	-
80. *Raphanus raphanistrum* L.	-	0.55(4.37)	-	-
81. *Rorripa palustris* L.	1.62(3.65)	1.85(2.37)	0.29(7.37)	-
82. *Rumex dentatus* L.	12.37(1.75)	17.77(1.38)	4.01(3.75)	-
83. *Senecio glaucus* L.	-	0.17(4.48)	-	-
84. *Sesbania sericea* (Willd.)Link	-	-	2.13(3.66)	6.20(3.00)
85. *Setaria verticillata* (L.) P. Beauv.	0.12(4.36)	0.34(4.37)	5.24(2.89)	-
86. *Setaria viridis* (L.) P. Beauv.	-	-	0.35(5.42)	-
87. *Sida alba* L.	-	-	0.11(7.47)	-
88. *Silene rubella* L.	-	1.17(4.35)	-	-
89. *Sinapis arvensis* L.	-	0.60(4.35)	-	-
90. *Sisymbrium irio* L.	0.58(2.99)	-	0.17(7.30)	-
91. *Solanum nigrum* L.	-	-	0.16(6.15)	-
92. *Sonchus oleraceus* L.	20.13(0.77)	20.04(1.09)	0.71(3.38)	-
93. *Spergularia marina* (L.) Griseb.	-	0.22(4.41)	0.12(7.02)	-
94. *Stellaria pallida* (Dumort.)Murb.	-	-	0.12(7.58)	-
95. *Symphyotrichum squamatum* (Spreng.)	-	-	1.52(6.50)	-
96. *Torilis arvensis* (Huds.)Link	-	0.31(4.36)	0.04(6.46)	-
97. *Trifolium resupinatum* L.	0.44(3.27)	5.17(2.10)	-	-
98. *Urospermum picroides* (L.) F. W. Schmidt.	0.27(4.34)	-	-	-
99. *Urtica urens* L.	0.34(4.39)	-	0.75(6.42)	-
100. *Veronica anagallis-aquatica* L.	-	1.82(4.37)	-	-
101.*Vicia monantha* Retz.	0.72(4.38)	-	-	-
102. *Vicia sativa* L.	4.45(1.99)	-	0.02(6.59)	-

Table (4). Mean and coefficient of variation (value between brackets) of the importance values (out of 200) of recorded species in the different vegetation groups resulting from the TWINSPAN classification of the sampling stands of the canal and canal bank habitats

Species	Vegetation group			
	A	B	C	D
1. *Alternanthera sessilis* (L.) DC	-	1.11(3.17)	1.39(3.00)	1.47(4.66)
2. *Amaranthus hybridus* L.	-	-	-	0.05(5.47)
3. *Amaranthus lividus* L.	-	-	5.08(1.50)	1.28(2.35)
4. *Ammi majus* L.	-	-	-	0.09(5.28)
5. *Anagallis arvensis*	-	-	-	4.17(1.67)
6. *Apium graveolens* L	-	-	-	0.17(3.71)
7. *Arundo donax* L.	15.50(1.21)	1.54(3.16)	-	-
8. *Azolla filiculoides* Lam.	3.70(2.45)	-	-	-
9. *Bassia indica (*Wight) A.J. Scott	-	-	0.50(5.37)	-
10. *Beta vulgaris* L.	-	-	-	7.56(2.04)
11. *Capsella bursa- pastoris* L.	-	-	-	0.27(5.28)
12. *Ceratophyllum demersum* L.	-	36.28(0.66)	-	-
13. *Chenopodium album* L	-	-	-	3.29(1.93)
14. *Chenopodium ambrosioides* L.	-	-	-	0.65(4.95)
15. *Chenopodium ficifolium* Sm.	-	-	-	0.12(5.26)
16. *Chenopodium glaucum* L.	-	-	-	0.29(5.16)
17. *Chenopodium murale L*	-	-	1.19(4.34)	3.23(3.22)
18. *Convolvulus arvensis* L	-	-	0.90(4.85)	5.50(2.45)
19. *Conyza aegyptiaca* (L.) Dryand	-	-	-	4.43(2.32)
20. *Conyza bonariensis* (L.) Cronquiskt	-	-	2.43(4.70)	2.57(3.88)
21. *Corchorus olitorius* L.	-	-	1.21(3.43)	-
22. *Coronopus didymus* (L.) Sm.	-	-	-	0.29(5.22)
23. *Coronopus squamatus* (Forssk)	-	-	-	0.53(3.69)
24. *Cynanchum acutum* L.	-	-	0.60(5.39)	-
25. *Cynodon dactylon* (L.) Pers	-	-	8.38(2.92)	7.65(1.31)
26. *Cyperus alopecuroides* Rottb	9.07(1.96)	7.84(1.41)	3.41(2.14)	0.20(3.68)
27. *Cyperus articulatus* L.	-	-	-	1.89(5.19)
28. *Cyperus difformis* L.	-	-	8.44(2.23)	-
29. *Cyperus rotundus* L	-	-	1.70(2.70)	3.64(1.89)
30. *Datura stramonium* L.	-	-	-	0.39(5.15)
31. *Digitaria sanguinalis* (L.) Scop	-	-	2.44(2.78)	-
32. *Dinebra retroflexa* (Vahl) Panz.	-	-	8.27(2.23)	-
33. *Echinochloa colona* (L.) Link	-	40.65(0.52)	38.53(1.04)	1.75(2.08)
34. *Echinochloa crus-galli* (L.) P. Beauv.	-	-	16.86(1.83)	
35. *Echinochloa stagnina* (Retz.) P. Beauv.	25.94(0.84)	-	0.35(5.46)	2.17(3.24)
36. *Eclipta prostrate* (L.) Hassk.	-	2.99(2.14)	3.34(3.14)	0.15(3.55)
37. *Eichhornia crassipes* (C. Mart.) Solms	56.21(0.42)	35.93(0.78)	-	-
38. *Ethulia conyzoides* L.f.	2.38(2.45)	-	5.15(2.36)	-
39. *Euphorbia peplus* L.	-	-	-	0.24(5.24)
40. *Imperata cylindrica* (L.) Raeusch.	-	-	0.92(5.36)	3.16(2.28)
41. *Ipomoea carnea* Jacq.	-	-	-	0.06(5.00)
42. *Leersia hexandra* Sw.	-	-	11.33(1.60)	-
43. *Lemna gibba* L	26.06(0.60)	4.44(2.55)	-	-
44. *Leptochloa fusca* (L.) Kunth	-	-	1.33(3.56)	1.20(2.91)
45. *Lolium perenne* L.	-	-	-	3.70(2.58)
46. *Ludwigia stolonifera* (Guill. & Perr.) P.H. Raven	30.07(0.80)	12.62(1.12)	2.34(3.32)	0.86(4.79)
47. *Malva parviflora* L.	-	-	0.14(5.44)	2.38(3.57)
48. *Medicago intertexta* L.	-	-	-	0.76(2.57)
49. *Medicago polymorpha* L.	-	-	-	0.25(5.29)

Table (4). Continued.

50. *Medicago sativa* L.	-	-	-	2.31(2.45)
51. *Melilotus indicus* (L.) All.	-	-	-	2.55(3.43)
52. *Mentha longifolia* (L.) Huds	-	-	2.70(3.19)	7.56(1.68)
53. *Myriophyllum spicatum* L.	3.92(2.45)	12.68(1.97)	-	-
54. *Nymphaea lotus* L.	3.33(2.45)	-	-	-
55. *Oxalis corniculata* L.	-	-	1.00(4.36)	21.96(4.49)
56. *Panicum repens* L.	-	-	2.72(3.30)	-
57. *Paspalidium geminatum* (Forssk.) Stapf.	-	-	8.14(2.71)	-
58. *Paspalum distichum* L.	-	-	14.12(1.74)	1.44(3.42)
59. *Pennisetum setaceum* (L.) R.Br.	-	-	0.41(5.37)	-
60. *Persicaria lapathifolia* (L.) Gray	-	1.98(2.13)	-	-
61. *Persicaria salicifolia* (Willd) Assenov	-	17.30(0.82)	6.42(2.09)	1.29(2.90)
62. *Persicaria senegalensis* (Meisn.)	-	-	-	0.05(5.66)
66. *Phalaris minor* Retz.	-	-	-	0.14(5.24)
64. *Phragmites australis* (Cav.) Trin. ex Steud.	16.67(1.59)	14.44(1.31)	1.83(3.31)	4.03(3.48)
65. *Phyla nodiflora* (L.) Greene		-	0.17(5.42)	-
66. *Pistia stratiotes* L.	2.38(2.45)	-	-	-
67. *Plantago major* L.	-	-	1.80(3.57)	4.45(3.28)
68. *Pluchea dioscoridis* (L.) DC	-	-	2.51(2.68)	0.14(4.09)
69. *Poa annua* L.	-	-	3.53(2.50)	-
70. *Polygonum equisetiforme* (Sm.)	-	-	1.48(4.34)	-
71. *Polypogon monspeliensis* (L.) Desf	-	-	-	15.88(1.21)
72. *Polypogon viridis*(Gouan) Breistr.	-	-	-	15.06(1.59)
73. *Portulaca oleracea* L.	-	-	7.90(1.90)	2.28(2.56)
74. *Potamogeton pectinatus* L.	-	1.54(3.16)	-	-
75. *Pseudognaphalium luteoalbum* (L.) Hilliard	-	-	1.48(4.07)	1.22(4.28)
76. *Ranunculus sceleratus* L.	-	-	-	3.77(1.92)
77. *Ricinus communis* L.	-	-	-	0.12(5.40)
78. *Rorripa palustris* L.	-	-	0.57(4.05)	4.79(1.70)
79. *Rumex dentatus* L.	-	-	-	18.95(1.15)
80. *Saccharum spontaneum* L.	4.76(2.45)	5.22(1.43)	1.35(3.58)	0.17(5.23)
81. *Schismus barbatus* L.	-	-	-	0.11(5.37)
82. *Schoenoplectus litoralis* (Schrad.)	-	-	0.79(5.39)	0.88(4.05)
83. *Senecio vulgaris* L.	-	-	-	0.40(5.24)
84. *Setaria verticillata* (L.) P. Beauv.	-	-	0.24(5.42)	4.10(5.20)
85. *Setaria viridis* (L.) P. Beauv.	-	-	1.08(4.70)	-
86. *Silybum marianum* (L.) Gaertn.	-	-	-	0.35(5.26)
87. *Solanum nigrum* L.	-	-	0.30(5.35)	0.61(2.97)
88. *Sonchus oleraceus* L.	-	-	0.27(3.93)	12.29(1.40)
89. *Sorghum virgatum* (Hack.) Stapf.	-	-	3.01(4.11)	-
90. *Symphyotrichum squamatum* (Spreng) Nesom	-	-	7.68(1.88)	0.43(5.25)
91. *Trifolium resupinatum* L.	-	-	-	2.21(2.50)
92. *Typha domengensis* (pers.) Poir ex Steud.	-	1.91(3.15)	2.03(5.39)	6.84(3.77)
93. *Urospermum picroides* (L.) F. W. Schmidt.	-		-	0.06(5.20)
94. *Veronica anagallis-aquatica* L.	-	1.54(3.16)	0.16(5.32)	15.83(1.61)
95. *Vicia sativa* L.	-	-	-	0.78(4.54)
96. *Withania somnifera* L.	-	-	0.18(5.37)	-

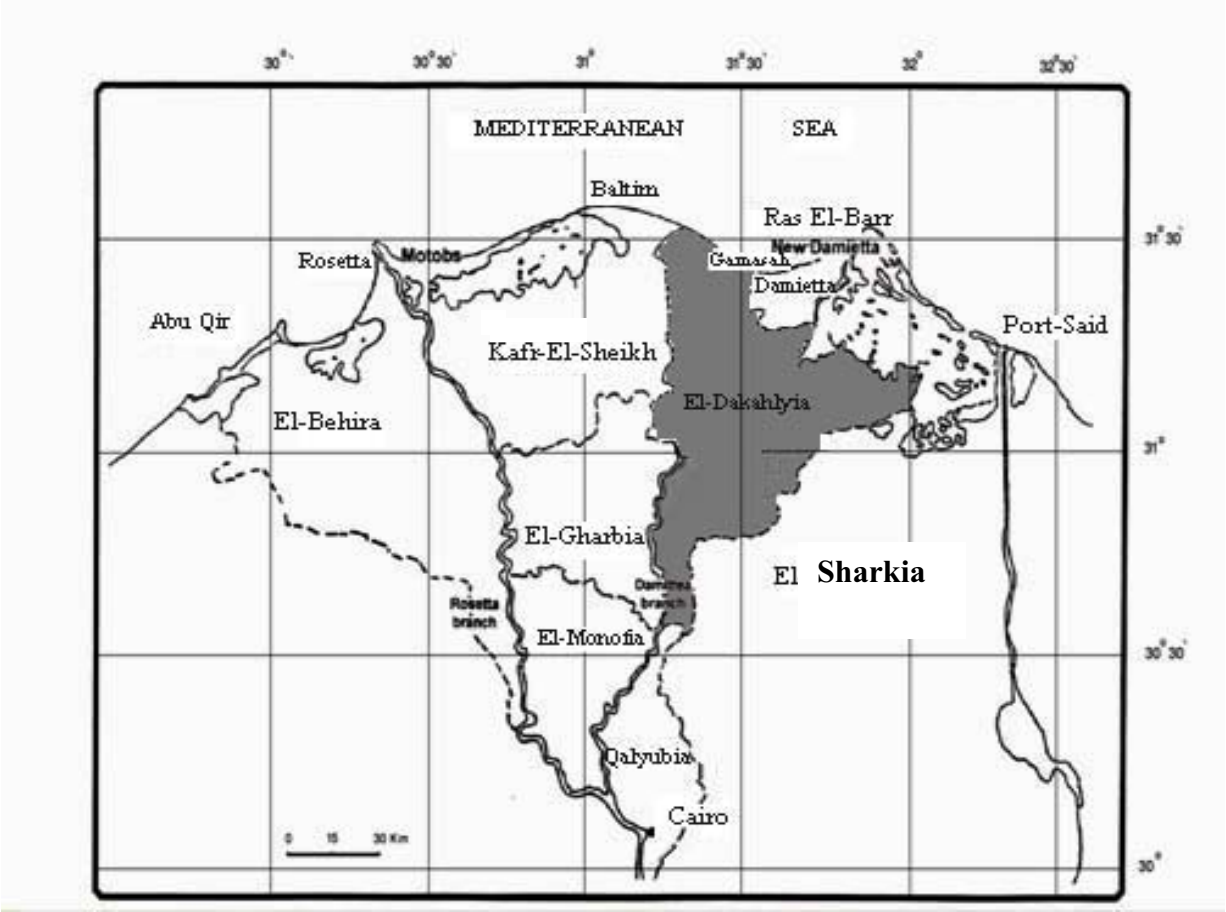


Figure (1). Map of the Nile Delta Region of Egypt showing the location of El-Dakahlyia Governorate ( )

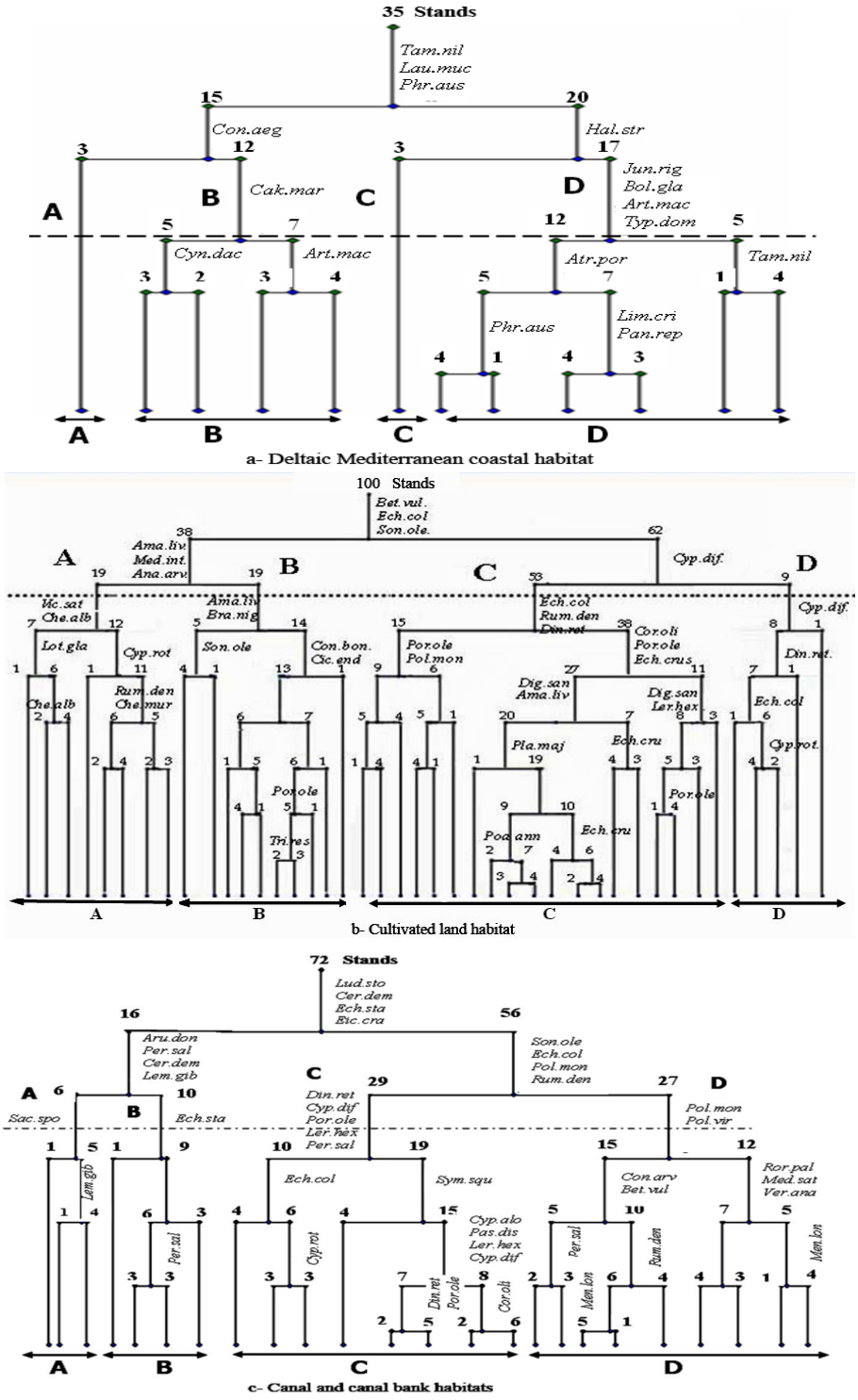


Figure (2 a,b&c) : Two Way Indicator Species Analysis (TWINSPAN) dendrogram based on the importance values of the weed species of the three habitats in El-Dakahlyia Governorate. The indicator species are abbreviated by the first three letters of genus and species, respectively.

Deterended Correspondence Analysis (DCA). The ordination diagram of the sampled stands of the different habitat types in the study area is shown in Figure (3). The vegetation groups yielded by TWINSPAN classification are markedly distinguishable and having a clear pattern of segregation on the ordination planes. All the vegetation groups are located on the positive sides of the first and second axes. In the Deltaic Mediterranean coastal habitat, groups A and B are obviously separated at the right side of the diagram, while the other groups (C & D) are separated at the left side of the diagram. Group C is segregated at the middle part of the left side of the DCA diagram. In cultivated land habitat, groups A and B are separated at the right side of the diagram, while the other two groups (C & D) are separated at the left side of the diagram, group C is segregated at the middle part of the left side of the DCA diagram. While in canal and canal bank habitats, it is obvious that groups A, B and D are clearly separated at the left side of the diagram whereas the last group C is separated at the right side of the diagram. Groups A and B are segregated at the outermost upper right side of the DCA diagram, but group D is separated at the outermost lower right side of the DCA diagram.

C. Vegetation - Soil Relationship

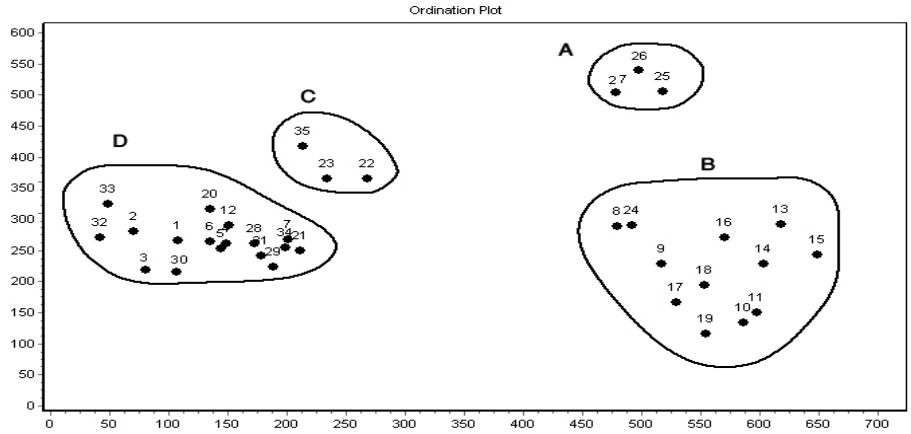
1. Relation between soil variables and vegetational groups: The variation in soil variables (mean ± standard error) within the groups of sampled stands represented by TWINSPAN classification of the studied habitats are shown in Table (5). In the Deltaic Mediterranean coastal habitat, the soil is sandy, slightly alkaline with low percentages of carbonates and bicarbonates in all vegetation groups. Group B has attained the highest concentration of total nitrogen and total phosphorus, while group C attained the highest percentage of soil porosity (44.64%) and concentration of potassium (2.93 mg/100 g dry soil). The highest value of water holding capacity (35.76%), calcium carbonate (9.24%), organic carbon (1.50%), electrical conductivity (4.89 mmhos/cm), chlorides (0.64%), sulphates (0.59%), sodium (573.78 mg/100 g dry soil), calcium (76.18 mg/100 g dry soil), Magnesium (40.50 mg/100 g dry soil) and sodium adsorption ratio (60.89) were recorded in group D. In the cultivated land habitat, it is obvious that, values of soil texture, porosity, water-holding capacity, organic carbon, bicarbonates, total phosphorous, calcium and magnesium cations are nearly comparable in four vegetation groups. It has been also found that, values of calcium carbonates, pH value, electrical conductivity, chlorides, sulphates, sodium cation and sodium adsorption ratio are relatively higher in groups A and B than in groups C and D. On the other hand, values of total nitrogen, potassium cation and potassium adsorption ratio are higher in groups C and D than in groups A and B. In the canal and canal bank habitats, it is obvious that, the soil texture, soil porosity, water-holding capacity, calcium carbonate, soil reaction, electrical conductivity, sulphates, carbonates and bicarbonates are comparable in all groups of this habitat type. The mean percentage of organic carbon ranged between 1.45% in group C to 3.33% in group A. While mean concentration of total nitrogen ranged between 98.43 mg/100g dry soil in group D to 176.19mg/100g dry soil in group B. Group A attained the highest concentrations of sodium, magne-

Table (5). Mean and standard error of the different soil variables in the sampling stands representing the different vegetation groups obtained by TWINSPAN classification of the different habitat types in El-Dakahlyia Governorate

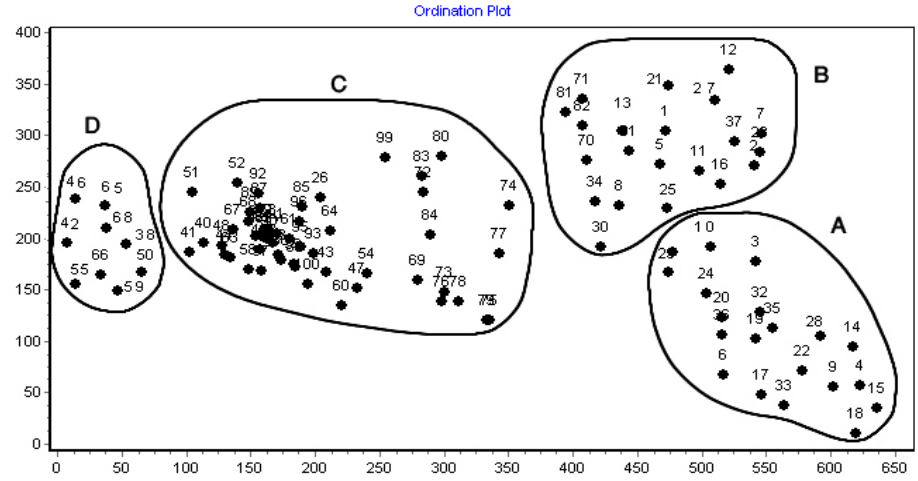
Habitat types & vegetation groups / Soil variable		Deltaic Mediterranean coastal habitat				Cultivated land habitat				Canal and canal bank habitats			
		A	B	C	D	A	B	C	D	A	B	C	D
Sand (%)		93.59± 3.07	94.23±1.05	94.73±2.46	90.93±1.75	95.83±1.02	93.71±1.32	92.59±0.73	90.89±0.86	93.933±1.09	93.60±0.90	90.28±0.88	93.15±1.10
Silt (%)		5.95±2.89	4.89±0.92	4.43±2.23	8.11±1.76	4.17±1.02	6.18±1.33	6.27±0.74	6.44±0.82	4.33±0.88	3.90±0.75	6.97±0.87	6.78±1.09
Clay (%)		0.46±0.18	0.88±0.21	0.83±0.42	0.95±0.20	0.00±0.00	0.11±0.11	1.11±0.19	2.67±0.17	2.33±0.33	2.50±0.22	2.76±0.15	0.07±0.05
Porosity (%)		37.64±2.75	40.42±1.62	44.64±3.30	41.24±0.72	42.29±0.58	40.82±0.92	40.43±0.59	39.03±1.27	44.55±0.85	42.40±1.48	38.17±0.72	39.00±0.54
W.H.C. (%)		31.00±3.28	30.00±1.15	30.29±1.30	35.76±1.62	55.24±2.08	53.53±1.59	52.59±1.03	52.76±2.82	62.80±2.35	58.81±1.64	53.96±1.76	56.51±1.83
$CaCO_3$ (%)		7.33±2.96	3.00±048	8.33±1.76	9.24±1.09	9.61±0.83	9.63±0.84	5.91±0.28	6.33±0.93	6.83±0.95	7.10±0.43	9.21±0.77	7.56±0.47
Organic carbon (%)		0.18±0.07	0.31±0.05	1.18±0.76	1.50±0.17	1.84±0.08	1.72±0.09	1.33±0.05	1.66±0.16	3.33±0.23	3.05±0.27	1.45±0.09	1.69±0.07
pH		8.52±0.23	8.48±0.10	8.06±0.38	7.95±0.10	8.34±0.05	8.16±0.05	7.80±0.04	7.62±0.07	8.06±0.16	8.05±0.18	7.72±0.04	8.23±0.05
EC (mmhos/cm)		0.51±0.31	0.35±0.12	2.46±0.17	4.89±1.27	0.49±0.09	0.56±0.09	0.26±0.02	0.26±0.05	0.56±0.15	0.56±0.10	0.22±0.02	0.42±0.06
Cl^- (%)		0.06±0.01	0.05±0.01	0.28±0.03	0.64±0.22	0.06±0.03	0.07±0.03	0.03±0.01	0.04±0.01	0.08±0.01	0.05±0.01	0.02±0.00	0.03±0.01
SO_4^- (%)		0.20±0.06	0.24±0.03	0.48±0.10	0.59±0.10	0.23±0.03	0.23±0.03	0.16±0.02	0.20±0.03	0.15±0.03	0.15±0.02	0.18±0.02	0.24±0.04
CO_3 (%)		0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00
HCO_3 (%)		0.04±0.01	0.05±0.00	0.11±0.06	0.12±0.01	0.12±0.01	0.12±0.01	0.12±0.01	0.14±0.01	0.19±0.02	0.19±0.01	0.12±0.01	0.12±0.01
T.N	(mg / 100 g dry soil)	33.21±12.31	54.47±4.33	46.64±8.82	49.94±3.32	122.54±8.98	116.43±12.13	143.83±5.64	137.19±11.80	158.50±18.97	176.19±18.54	157.09±8.73	98.43±7.78
T. Ph		0.20±0.00	0.21±0.02	0.19±0.02	0.19±0.02	0.18±0.02	0.21±0.02	0.18±0.01	0.20±0.01	0.19±0.02	0.16±0.03	0.19±0.01	0.190.01
Na^+		33.60±12.30	22.43±4.66	88.33±9.23	573.78±273.18	36.94±6.64	40.58±7.18	19.69±1.46	21.27±1.78	39.29±14.20	37.30±8.79	19.05±0.69	22.94±3.71
K^+		2.13±1.37	1.36±0.22	2.93±1.32	2.77±0.47	1.55±0.16	1.90±0.45	2.82±0.30	2.35±0.38	2.45±0.79	1.04±0.09	1.15±0.10	1.15±0.13
Ca^{++}		34.24±22.96	17.39±2.06	63.57±24.45	76.18±10.61	24.52±3.16	24.15±3.02	21.44±1.59	23.83±2.84	47.76±12.86	34.87±2.36	22.11±1.50	28.39±3.73
Mg^{++}		22.08±16.65	7.00±1.33	19.90±6.29	40.50±6.22	7.46±2.36	6.65±1.44	5.54±0.48	6.21±1.15	23.10±12.13	6.71±1.01	6.58±0.74	6.59±1.69
SAR		7.27±0.12	6.80±1.30	14.38±3.78	60.89±23.55	10.47±3.43	11.30±2.48	5.52±0.37	5.64±0.57	8.75±4.41	8.33±1.99	5.16±0.21	5.63±0.85
PAR		0.37±0.11	0.39±0.05	0.47±0.14	0.36±0.05	0.40±0.03	0.49±0.10	0.73±0.06	0.61±0.09	4.01±1.52	1.59±0.23	2.06±0.25	1.60±0.23

Abrreviations:

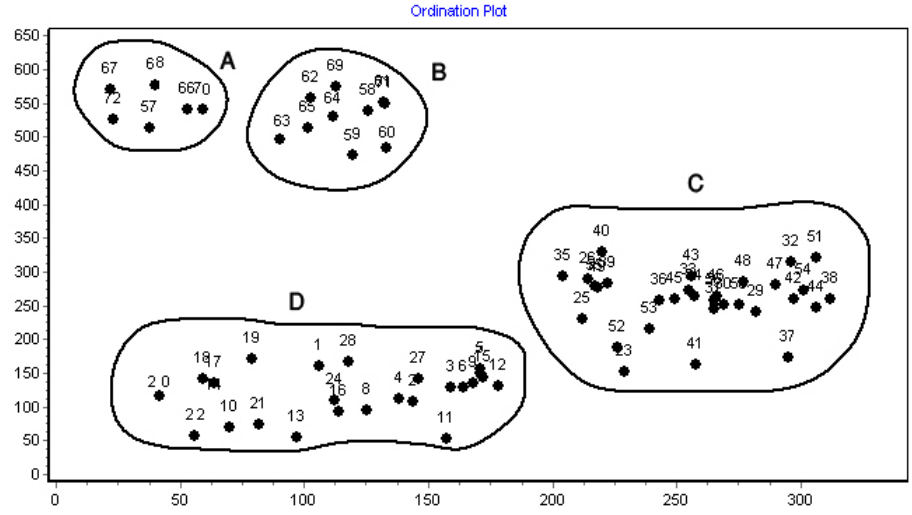
W.H.C.=Water-holding capacity **O.C. = Organic carbon** **SAR =Sodium adsorption ratio** **T.Ph =Total phosphorus**
TN =Total nitrogen **E.C. = Electrical conductivity** **PAR =Potassium adsorption ratio**



a- Deltaic Mediterranean coastal habitat



b- Cultivated land habitat



c- Canal and canal bank habitats

Figure (3 a,b&c). Deterended Correspondence Analysis (DCA) ordination diagram of 207 sampled stands in the three habitats (a, b & c) in El-Dakahlyia Governorate .

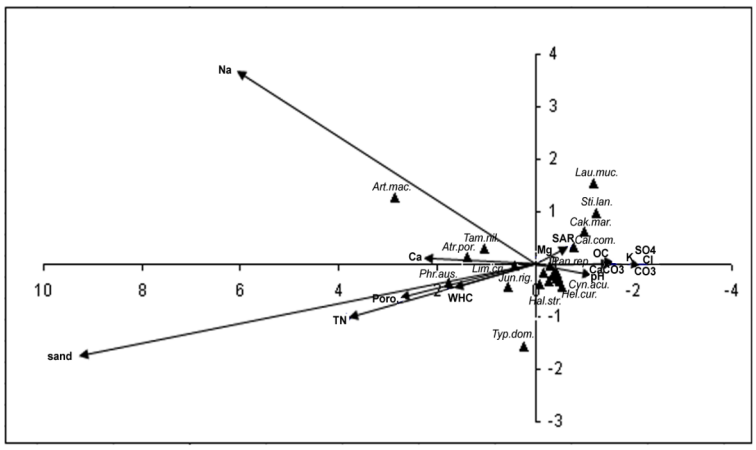
sium, sodium adsorption ratio and potassium adsorption ratio.

2. The correlation between soil variables and vegetational gradients: The correlation between vegetation and environment is indicated on the ordination diagram produced by Canonical Correspondence Analysis (CCA) of the biplot of species - environment (Figure 4a-c). The length and direction of an arrow representing a given environmental variable provide an indication of the importance and direction of the gradient of environmental change, for that variable within the set of samples measured which showed a highly significant correlation with the first and second axes of CCA diagram. The most important soil variables in the Deltaic Mediterranean coastal habitat are sand, sodium cation, total nitrogen ,soil porosity and potassium cation (Figure 4a). While, in the cultivated land habitat, the most important edaphic factors are total nitrogen , sand and soil porosity (Figure 4b). The most effective soil gradients in the canal and canal bank habitats are total nitrogen , sand , water- holding capacity , calcium carbonate and total dissolved phosphorus (Figure 4c).

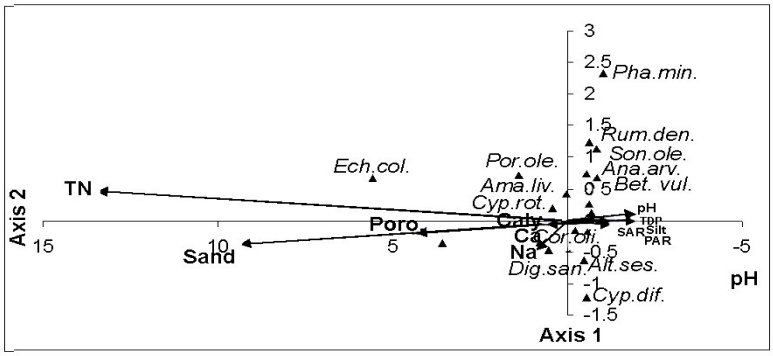
DISCUSSION

The weed vegetation is a system resulting from an aggregative process of plant species in a habitat where ecological selection is chiefly due to the crop management technique. The productivity analysis of the vegetation is therefore mainly focused on identifying the agronomic factors responsible for its variations (Ferrari *et al.,* 1984).

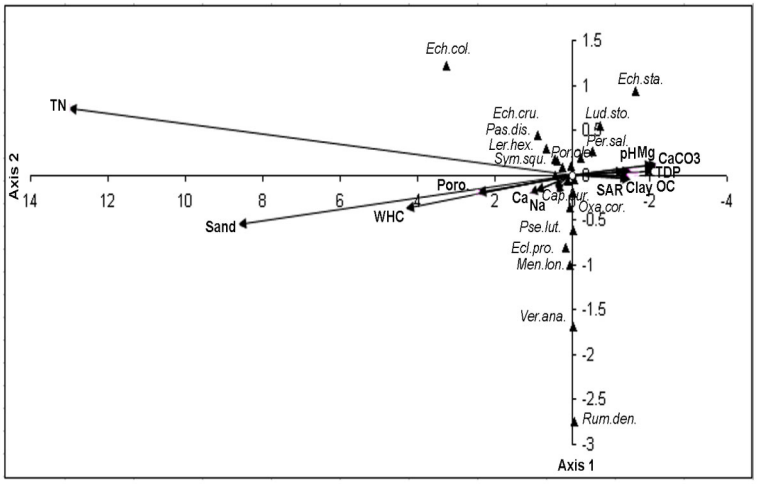
The present study of El-Dakahlyia area revealed that, the natural plant cover of this area is composed of 197 species belonging to 147 genera grouped under 47 families. Out of these families, Gramineae, Compositae, Chenopodiaceae, Leguminosae, Cruciferae and Cyperaceae are the major families contributing collectively about 60.4% of the total recorded species. This indicated that, these six families are the leading taxa and constitute the main bulk of the flora of the study area. This is in more or less agreement with findings of Quezel (1978); Mashaly and Awad (2003); Shaltout *et al.* (2005), and Omar (2006). On the basis of plant longevity (duration), the recorded species (197) in the study area are composed of 89 perennials (45.18%), 7 biennials (3.55%) and 101 annuals (51.27%). The dominance of annuals could be attributed to the fact that, annuals have high reproductive capacity , ecological, morphological and genetic plasticity under high levels of disturbance e.g. agriculture practices(Grime, 1979).Beside the spatial variations in species composition of plant duration, the composition of the life-forms provides information which may help in assessing the response of vegetation to variations in certain environmental factors (El-Ghareeb, 1975). The life-form spectra are important physiognomic attributes which have widely used by ecologists and chorologists in the vegetation and floristic studies (Cain and Castro, 1959). In the present study, the life-form spectra indicated that, therophytes are the most frequent type (53.3%), followed by geophytes (12.18%) and hemicryptophytes (10.15%). This trend is similar to spectra reported in the Egyptian flora (Hassib, 1951; Shalaby, 1995 and El-Kady *et al.,* 1999). From the floristic point of view, Egypt is meeting point of floristic elements belonging to at least four phytogeographical regions: the African Sudano-



a- Deltaic Mediterranean coastal habitat



b- Cultivated land habitat



c- Canal and canal bank habitats

Figure (4 a,b&c). Canonical Correspondence Analysis (CCA) ordination diagram of plant species in the three habitats (a , b, c) along the gradient of environmental variables (arrows) in El-Dakahlyia Governorate. The indicator and preferential species are indicated by three first letters of genus and species, respectively.

Zambesian, the Asiatic Irano-Turanian, the Afro-Asiatic Sahro- Sindian and the Euro-Afro Asiatic Mediterranean (El-Hadidi, 1993). The floristic analysis of the present study indicated that, the Mediterranean taxa in El-Dakahlyia area are represented by a relatively high percentage of plant species (46.19%).The other floristic elements such as Cosmopolitan, Palaeotropical, Pantropical, Neotropical, Irano-Turanian, Saharo-Sindian, Euro-Siberian and Sudano- Zambezian elements are representing by varying number of species, reflecting their different capability to penetrate the region. This can be attributed to the influence of man and the history of agriculture in the study area.

Kershaw and Looney (1985) stressed upon the importance of comprehensive description of vegetation to build a mental picture of an area and its vegetation, and to allow a comparison as well as the ultimate classification of different vegetation units. In the present work the phytosociological studies revealed that, the vegetation structure is classified by TWINSAN classification into 12 groups (4 groups for each habitat type). In the Deltaic Mediterranean coastal habitat, group A is dominated by *Cynanchum acutum,* group B is dominated by *Arthrocnemum macrostachyum,* group C is dominated by *Halocnemum strobilaceum* and group D is dominated by *Phragmites australis.* Group A may represent the vegetation type of sand formations (dunes and flats), groups B and C may represent the vegetation of salt marsh habitat, while group D may represent the swampy and lake shoreline habitats. These identified groups are similar to those recognized by Serag (1986) and by Mashaly (1987).

The weed vegetation of the cultivated land habitat type is classified into four groups. Group A is dominated by *Polypogon monspeliensis,* group B is dominated by *Sonchus oleraceus,* group C is dominated by *Echinochloa colona* and group D is dominated by *Echinochloa crus-galli*. Groups A and B may represent the habitat of winter field crops and orchards, group C may represent the summer field crops and orchards and group D may represent the rice fields. The associations of vegetation analysis recognized in the cultivated land habitat may be similar to the associations described by Kosinova (1975), El-Fahar (1989) and 0mar (2006).

The vegetation of canal and canal banks is also classified into four groups dominated by *Eichhornia crassipes* (group A), *Echinochloa colona* (groups B & C) and *Oxalis corniculata* (group D). Similar investigation have been described by El-Sheikh (1989) on the vegetation - environmental relationships of the canal banks of the middle Delta region and Al-Sodany (1998) on the vegetation analysis of canals, drains and lakes of northern part of Nile Delta region.

The most important soil gradients correlated with the distribution of vegetation as recognized by Mashaly (1987 & 2001), El-Sheikh (1989), Al-Sodany (1992), El-Halawany (2003), and Omar (2006) are soil salinity, moisture gradient, soil fertility (organic carbon and phosphorus content), soil texture and pH value. In the present study, the application of Canonical Correspondence Analysis (CCA- biplot) indicated that, the most important soil variables correlated with the distribution and abundance of weed vegetation in the Deltaic Mediterranean coastal habitat are

sand, sodium cation , total nitrogen , soil porosity and potassium cation. While in the cultivated land habitat they are total nitrogen, sand and soil porosity. In the canal and canal bank habitats these variables are total nitrogen , sand , water - holding capacity , calcium carbonate and total dissolved phosphorus.

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الملخص العربى

الموائـــل والحيـاة النباتيـــة فى محافظـــة الدقهليـة بمصـر

السيد الحلـوانى إبراهـيـم مشـالى محمـد أبوزيـادة محمـد عبدالعـال
قسـم النبـات - كليـة العلـوم - جامعـة المنصـورة - مصـر

أستهدفت هذه الدراسة تقديم وصفاً تفصيلياً للملامح الفلورية والبيئية لمحافظة الدقهلية وقد تم دراسة ثلاث بيئات مختلفة وهى بيئة ساحل الدلتا المطل على البحر المتوسط وبيئة الأراضى المنزرعة وبيئة الجسور وقنوات الرى والصرف حيث تم تحليل كمى وكيفى للغطاء النباتى لفلورا الأعشاب المصاحبة لهذه البيئات وذلك لعمل مسح شامل ودقيق للتنوع البيئى بمنطقة الدراسة.

وأظهرت النتائج تسجيل ١٩٧ نوعاً من النباتات الزهرية والتى تتبع ١٤٧ جنساً وتنتمى إلى ٤٧ عائلة نباتية، وقد صنفت هذه النباتات إلى ١٠١ نوعاً من النباتات الحولية و٧ أنواع من النباتات ثنائية الحول و٨٩ نوعاً من النباتات المعمرة، ووصف طرز الحياة النباتية فى منطقة الدراسة وتم تقدير النسبة المئوية لكل طراز حيث وجد أن طراز الحوليات Therophytes يمثل الطراز الأول السائد بالمنطقة فقد حقق نسبة ٥٣ر٣٪، وأوضح التحليل الفلورى أن هناك ١٩ر٤٦٪ من النباتات المسجلة تتبع عنصر البحر المتوسط.

باستخدام برامج التصنيف والتسلسل أمكن التعرف على إثنى عشر مجموعة من النباتات العشبية، وباستخدام برنامج التوزيع التطابقى العكسى (DCA) فقد أمكن فصل المجموعات العشبية الناتجة عن استخدام برنامج التصنيف والتسلسل ثنائى الاتجاه فقد اتضح أن بعض المجموعات العشبية قد انفصلت بوضوح عن بعضها البعض فى البيئات المتنوعة بمنطقة الدراسة والبعض الآخر بدت متداخلة مع بعضها البعض عند وسط المستوى أو ناحية محاور التسلسل وذلك نظراً لتشابه تركيبها الفلورى وباستخدام برنامج التوزيع التطابقى الكنسى (CCA)فقد تم التوصل إلى تحديد أهم عوامل التربة ارتباطاً بمحاور التسلسل.

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HABITAT AND PLANT LIFE IN EL-DAKAHLYIA GOVERNORATE , EGYPT

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