Floristic composition of Nile islands in Middle Egypt, with special reference to the species migration route

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Abstract: The floristic composition of fifteen, out of 46 Nile islands, at Beni-Suef Governorate (latitude 28° 36′ to 29° 26′ N and longitude 30° 36′ to 31° 21′ E), Egypt, were subjected to field and herbarium studies. These islands were geo-morphologically classified into 7 inhabited cultivated permanent islands, 7 uninhabited cultivated temporary submerged islands and an uninhabited submerged and uncultivated one. This work was carried out to identify the floristic composition in these islands, demonstrate the chorological affinities of the collected species with special reference to the migration routes of some indicator species traced in the Nile islands in Beni-Suef region in comparison with the northern and southern Nile islands in the Egyptian territories. The floristic study of the selected islands indicated the presence of 151 species belonging to 116genera in 48 families of the vascular plants. The four major families based on the number of species were Poacaea, Asteraceae, Fabaceae and Brassicaceae; comprised 44.4% of the total monitored species. The number of species was higher in the inhabited than the uninhabited islands. Therophytes represented by 86 species (c. 57%) followed by the hydrophytes (17.8%) and geophytes (7.2%). Chaemophytes and Hemicryptophytes were equally represented by 7 species each (4.6%) of the total species detected in the study area. While, nano-Phanerophytes were represented by 9 species only. Thechorological affinities showed that cosmopolitan taxa had the highest contribution (26.5%), followed by bioregional (21.8%) and paleotropical (15.2%). Cosmopolitan taxa compared to the earlier northern and southern studied islands decreased southwardly from 28% in Cairo to 18.7 % in Aswan. Thechorological affinities of the traced species compared to its migration routes were outlined and discussed through in this work.

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Key words: Floristic composition, agro ecosystem, Egyptian flora, Nile islands, Species migration route.

1. Introduction

Species migration was defined by Sauer (1988) as any change in the distribution of successfully established mature plants as the years and generations pass. At the end of the last ice age the plant migration has been a subject of considerable interest to ecologists among them Reid(1899) and Skellam (1951). In the last century, this interest as concern over global change has increased and the potential for successful migration in managed, fragmented landscapes has been questioned (Higgins & Richardson, 1999).

Migration of plant species can occur as a slow local process whereby a species migrates in short steps as a "front" or as a rapid process mediated by long-distance dispersal events or "jump". Long-distance migration is a two stage process, requiring long-distance jumps followed by the establishment and spread of local populations (Neilson *et al*., 2005).

Peterson *et al.* (2002), Thuiller (2004) and Thomas *et al.* (2004) cited that there are two contrasting assumptions about migration ability: either species are unable on the time scale to disperse at all considered (no migration), or they have no constraints to dispersal and establishment. On the other hand Mooney *et al*. (2005) and Primentel *et al.* (2005) cited that many species have invaded and continue to invade new regions at an unprecedented rate owing to the increasing influence of humans, exerting strong impact on ecosystems and human welfare.

The world has about 250,000 living species of seed plants, each with a unique present geography and migration history (Sauer, 1988). Flora of Egypt consists of 2076 species, in 725 genera representing 120 families (Boulos, 1999).Egyptian flora has a special interest due to its unique mixture of native African, European and Asiatic species (Amer, 2008). Egyptian flora contains low number of endemic species (Boulos, 1995) and no endemic families (Wickens, 1976).The largest families in flora of Egypt are: Poaceae (241 species), Fabaceae (233 species), Asteraceae (230 species), Brassicaceae (101 species), Caryophyllaceae (85 species), Chenopodiaceae (75species) and Scrophulariaceae (63 species).

However, the flora of Nile land (Delta & Valley) received great attention of many researchers among them: El-Hadidi (1993), who claimed that the recorded species were mainly weed of cultivations, it amounted 470 species, in addition to 42 hydrophytes. Also the weed in irrigation canals of Nile delta also were subjected to studies by Khedr and El-Demerdash (1997), they attributed, the infestations of canals and drains in Egypt by aquatic weeds was affected by environmental factors as water transparency, depth of water, physic-chemical water quality, water currents and air temperature. And El-Gharably *et al.* (1982) attributed that to the pollution increase related to the human activities along water bodies.

Just through the last three decades, the floristic composition of the Nile Islands received attention. Detailed studies were carried out on particular islands, among these studies were the Nile islands in the following governorates: Aswan (Springuel, 1981) and Ali (2014), Qena (Hamed *et al*., 2012), Minya (Mohamed and Hassan, 1998) and Cairo (Galal, 1994). In addition to the biodiversity overview rewrite by Amer (2008). None of these studies treated the migration route and the species geographical limits in Nile islands.

This work was carried out to identify the floristic composition in these islands, demonstrate the chorological affinities of the collected species with a special reference to the migration route of some indicator species traced in the Nile islands at Beni-Suef region in comparison with the northern and southern Nile islands in the Egyptian territories.

2. Material and Methods

2.1. Study area:

The studied area, Beni-Suef Governorate, is located about 90 km south of Cairo (latitude 28° 36′ to 29° 26′ N and longitude 30° 36′ to 31° 21′ E). The climatic features of the studied area was characterized by rainy season stretches from November to April with a total annual rainfall of about 7.8 mm. The mean air temperature varies between 12.2°C during January and 29.1°c during July. The mean relative humidity ranges between 35% and 57% in May and December respectively (Hegazy *et al.,* 2004).

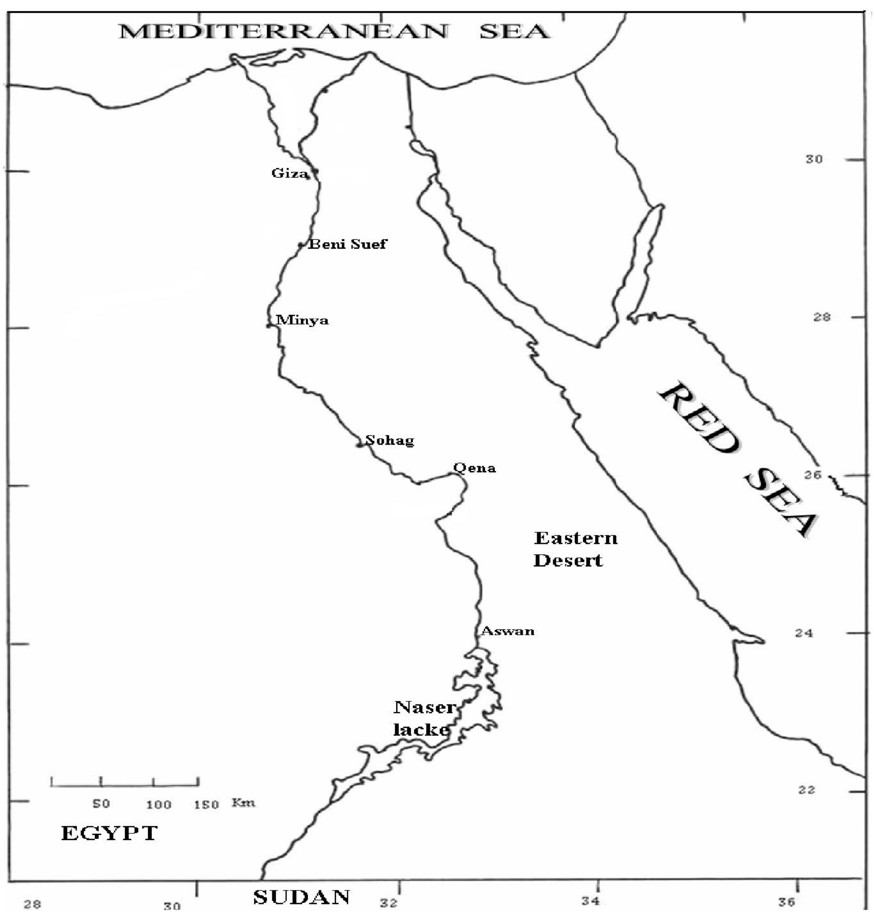

Figure (1). Location of the studied region (Beni-Suef governorate) and the compared ones.

Fifteen out of 46, the total number of Nile islands at Beni-Suef (Fig. 1), were subjected to almost intensive seasonal visits between 2009 and 2013.The selected15 islands were geo-morphologically classified into 7 inhabited and permanent islands that were cultivated throughout the whole year, another 7 uninhabited submerged islands in addition to an uninhabited submerged and uncultivated island. The studied submerged islands were those covered with water in summer months from July to October and either hosts cultivated plots or/and natural vegetation during the months of low Nile water level from November to June in most years.

2.2. Species identification:

The monitored vascular plant species seen on the studied 15 Nile islands were site-recorded, collected, identified and checked at Cairo University Herbarium (CAI). The identification and nomenclature were mainly based on Täckholm (1974) and Boulos (1995, 1997, 1999, 2000, 2002, 2005, 2008 and 2009). Voucher specimens kept at Cairo Herbarium (CAI).Chorology were cited according to Wickens (1976), Life forms (Therophytes, Geophytes, Hemicryptophytes, Chamaephytes and Phanrophytes) were identified according to Raunkiaer (1934).

3. Results

3.1. Floristic composition

A total of 151 vascular plant species were recorded from the studied 15 Nile islands. These taxa belonged to 48 families and 116 genera. The most species rich families were Poacaea, Asteraceae, Fabaceae and Brassicaceae represented by 30, 15,14 and 8 taxa; respectively. These four families comprised 44.4% of the total recorded species (Fig. 2).On the other hand, 27 families were poorly represented and traced as one species for each.

The floristic composition of the studied seven inhabited cultivated islands showed higher number of species compared to the uninhabited cultivated islands. This study cited that Zawet El gedamy attained the highest species number (79 species), among the studied inhabited islands followed by Al Koraymate (74 species),Beba (70 species), El-Alalma (69 species), while Baget Saleh (49 species) showed the lowest species number in this group. On the other hand the studied seven uninhabited cultivated islands showed lower species number compared to the inhabited islands. The detailed study revealed that Bani Soliman island contained the highest species number within the uninhabited islands with 68 species followed by Beni-Suef (51 species), Abu Selem (53 species),Tall El-Nayrouze (49 species), while Mansheyat Al- Sherka showed the lowest species number (33 species). Finally Al Shoqr island, the only submerged uncultivated uninhabited island, showed also a limited species number (36 species), all of them are naturally wild species and no weed of cultivations detected.

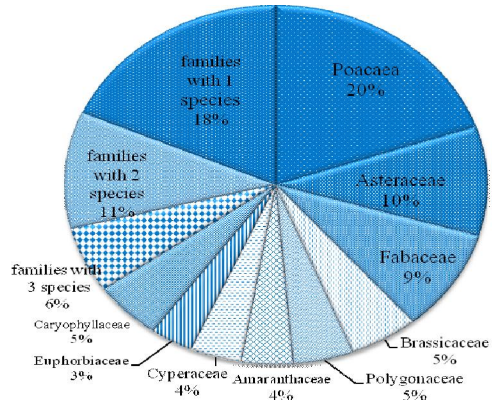

Fig. (2). Species richness families of the study area

3.2 The life form:

The life forms of the collected species revealed that the therophytes dominated the flora of the studied Nile islands. This represented by 86 species (c. 57%), followed by the hydrophytes (17.8%) and geophytes (7.2%). Chaemophytes and Hemicryptophytes were equally represented by 7 species each (4.6%) of the total species detected in the study area. While, nano-Phanerophytes were represented by 9 species only (Fig. 3).

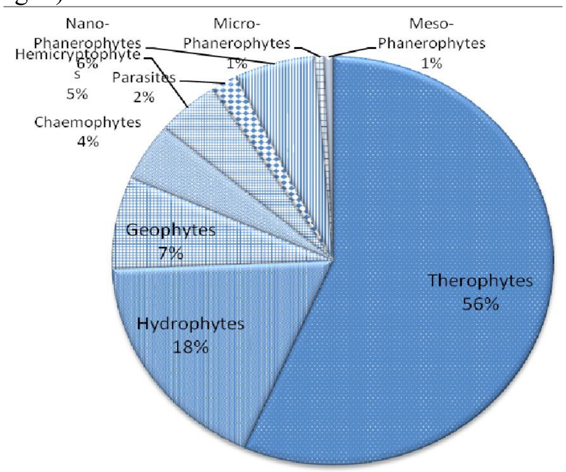

Fig. (3). Life forms of the monitored species

3.3 Chorological affinities

It was obvious that Cosmopolitan, Palaeotropical and Panotropical chorotypes constituted the main bulk of the recorded taxa, 79 species or about 52.3% of the total recorded species as shown in Table (1). Monoregional species, dominated by Sudano-Zambezian element, constituted 22 species (14.6%). The Mediterranean element, either mono-regional or penetrated to other regions; bioregional with Irano-Turanian, Saharo-Sindian, Euro-Siberian or Sudano-

Zambezian and Tri-regional were well represented by 48 species or about 31.8% of the recorded species. Pure or penetrated Sudano-Zambezian and Saharo-Sindian chorotypes were moderately represented by 21 and 16 species respectively. On the other hand, Tropical and Neotropical chorotypes were represented by only one species each (Table 1).

Table (1) showed the chorology and life form of the recorded species. COSM= cosmopolitan, PAL= Palaeotropical, PAN= Pantropical, S-Z= Sudano-Zambezian, MED= Mediterranean, SUD= Sudanian, SA-SI= Saharo-Sindian, TRP= Tropical, N.TRP= Neotropical, IR-TR= Irano-Turanian, EU-SB= Euro-Siberian. Th=Ttherophytes, Hy= Hydrophytes, H=Hemicryptophytes, N.Ph= Nano phanerophytes, M.Ph= Mesophanerophytes, Ch=Chaemophytes, G= Geophytes

Family	Species	Chorological group	Life-form
Ricciaceae	*Riccia aegyptica* Arnold	MED	Th.
Azollaceae	*Azolla caroliniana* Willd.	PAN	Hy.
Adiantaceae	*Adiantum capillus-veneris* L.	COSM	H.
Salicaceae	*Salix mucronata* Thunb.	SA-SI	N. Ph
	Populus euphratica Oliv.	IR-TR, SA-SI	N. Ph
Urticaceae	*Urtica urens* L.	MED, IR-TR, EU-SB	Th.
Polygonaceae	*Emex spinosa* (L.) Campd.	MED	Th.
	Persicaria salicifolia (Brouss. ex Willd.) Assenov	PAL	Hy.
	Persicaria senegalensis (Meisn.) Soják	S-Z	Hy.
	Persicaria lanigera (R. Br.)Soják	TRP	Th.
	Persicaria lapathifolia (L.)Gray	MED	Hy.
	Polygonum equisetiforme Sm.	MED, IR-TR	Ch.
	Rumex dentatus L. subsp. *dentatus*	MED, IR-TR	Th.
Molluginaceae	*Glinus lotoides* L.	PAL	Th.
Aizoaceae	*Trianthema portulacastrum* L.	PAN	Th.
Portulacaceae	*Portulaca oleracea*L.	COSM	Th.
Caryophyllaceae	*Stellaria pallida* (Dumort.)Murb.	MED, EU-SB	Th.
	Spergularia marina (L.)Bessler	MED, IR-TR,EU-SB	H.
	Polycarpon tetraphyllum (L.)	MED, EU-SB	Th.
	Polycarpon prostratum (Forssk.) Asch. & Schweinf	SA-SI, S-Z	Th.
Chenopodiaceae	*Chenopodium ambrosioides* L.	COSM	Ch.
	Chenopodium murale L.	COSM	Th.
	*Chenopodium album*L.	COSM	Th.
Amaranthaceae	*Amaranthus hybridus* L. subsp. *hybridus*	COSM	Th.
	Amaranthus retroflexus L.	COSM	Th.
	Amaranthus graecizans L.	MED, IR-TR	Th.
	Amaranthus viridis L.	COSM	Th.
	Amaranthus biltum subsp. *emerginatus* (Moq. ex Uline & Bray) Carretero et al.	MED, IR-TR	Th.
	Alternanthera sessilis (L.) DC.	PAN	Hy.
Ranunculaceae	*Ranunculus sceleratus* L.	MED, IR-TR. EU-SB	Hy.
Nymphaeaceae	*Nymphaea caerulea* L.	PAL	Hy.
Ceratophyllaceae	*Ceratophyllum demersum* L.	COSM	Hy.
Fumariaceae	*Fumaria parviflora* Lam.	MED, IR-TR, EU-SB	Th.
Cruciferae	*Rorippa palustris* (L.)Besser	MED	Hy.
	Brassica nigra (L.) Koch	COSM	Th.
	Brassica juncea (L.) Czernj.& Coss.	MED	Th.
	Sinapis allionii Jacq.	MED, IR-TR, EU-SB	Ch.
	Eruca sativa Mill.	MED, IR-TR	Th.
	Enarthrocarpus lyratus (Forssk.) DC.	MED	Th.
	Coronopus didymus (L.)Sm.	COSM	Th.
	Capsella bursa-pastoris (L.)Medik.	COSM	Th.
Rosaceae	*Potentilla supina* L.	S-Z	Th.
Leguminosae	*Trigonella hamosa* L.	MED, SA-SI	Th.
	Medicago polymorpha L. var. *vulgaris* (Benth.)Shinners	COSM	Th.
	Medicago sativa L. subsp. *sativa*	MED, IR-TR, EU-SB	Th.
	Melilotus indicus (L.) All.	PAL	Th.
	Trifolium resupinatum L. var. *resupinatum*	MED, IR-TR, EU-SB	Th.
	Lotus arabicus L.	SA-SI, S-Z	Th.
	Sesbania sesban (L.) Merr.	S-Z	N. Ph
	Alhagi graecorum Boiss.	PAL	Th.
	Vicia narbonensis L. var. *narbonensis*	MED, IR-TR, EU-SB	Th.
	Vicia sativa L. subsp. *Sativa*	MED, IR-TR, EU-SB	Th.
	Vicia sativa L. subsp. *nigra* (L.) Ehrh.	MED, IR-TR, EU-SB	Th.
	Vicia monantha Retz.	MED, IR-TR	Th.

	Senna alexandrina Mill.	SUD.	N. Ph
	Acacia nilotica (L.) Delilesubsp. *nilotica*	SUD.	M. Ph
Oxalidaceae	*Oxalis corniculata* L.	COSM	G.
Euphorbiaceae	*Ricinus communis* L.	PAN	Ch.
	Euphorbia prostrata Aiton	PAN	Th.
	*Euphorbia heterophylla*L.	PAN	N. Ph
	Euphorbia helioscopia L.	COSM	N. Ph
	Euphorbia peplus L.	COSM	Th.
Tiliaceae	*Corchorus olitorius* L.	PAN	Th.
Malvaceae	*Malva parviflora* L.	MED	Th.
Tamaricaceae	*Tamarix nilotica* (Ehrenb.) Bunge	SA-SI, S-Z	N. Ph
Cucurbitaceae	*Citrullus colocynthis* (L.)Schrad.	MED, SA-SI	H.
Onagraceae	*Ludwigia stolonifera* (Guill. & Perr.) P. H. Raven	S-Z	Hy.
Haloragidaceae	*Myriophyllum spicatum* L.	COSM	Hy.
Umbelliferae	*Ammi majus* L.	MED, IR-TR	Th.
Primulaceae	*Anagallis arvensis* L. subsp. *arvensis* var. *arvensis*	COSM	Th.
	Anagallis arvensis L. subsp. *arvensis* var. *caerulea* Gouan	COSM	Th.
Asclepiadaceae	*Oxystelma esculentum* (L.f.)R. Br.	S-Z	H.
	Cynanchum acutum L. subsp. *acutum*	MED, IR-TR, EU-SB	N. Ph
Rubiaceae	*Oldenlandia capensis* L. f.var. *capensis*	PAL	Th.
Convolvulaceae	*Convolvulus arvensis* L.	PAL	H.
Verbenaceae	*Phyla nodiflora* (L.) Greene	PAL	Ch.
	Verbena supina L.	MED, IR-TR,SA-SI	Th.
Labiatae	*Mentha longifolia* (L.) Huds. subsp. *typhoides* (Briq.)Harley	PAL	Hy.
	Lamium amplexicaule L.	COSM	Th.
Solanaceae	*Solanum nigrum* L. var. *nigrum*	COSM	Ch.
	Withania somnifera (L.) Dunal	SA-SI, S-Z	Ch.
	Datura stramonium L.	PAN	Th.
Scrophulariaceae	*Veronica anagallis-aquatica* L.	COSM	Hy.
	Veronica anagalloides Guss. subsp. *taeckholmiorum* Chrtek & Osb.-Kos	S-Z	Hy.
Orobanchaceae	*Orobanche ramosa* L. var. *schweinfurthii* (Beck) Hadidy	COSM	P.
	Orobanche crenata Forssk.	MED, IR-TR	P.
	Orobanche cernua Loefl.	MED, IR-TR	P.
Plantaginaceae	*Plantago major* L.	COSM	H.
Compositae	*Silybum marianum* (L.) Gaertn. var. *marianum*	MED, IR-TR, EU-SB	H.
	*Pluchea dioscoridis (*L.) DC.	SA-SI, S-Z	N. Ph
	*Conyza bonariensis (*L.) Cronquist	MED	Th.
	Sphaeranthus suaveolens (Forssk.) DC. var. *abyssinicus* (Steetz) Ross-Craig	S-Z	Th.
	Homognaphalium pulvinatum (Delile) Fayed & Zareh	IR-TR, SA-SI	Hy.
	Pseudognphalium luteoalbum (L.) Hilliard & B.L. Burtt	COSM	Th.
	Gnaphalium polycaulon Pers.	PAL	Th.
	Xanthium strumarium L.	COSM	Th.
	Eclipta prostrata (L.) L.	PAN	Th.
	Galinsoga parviflora Cav.	COSM	Th.
	Bidens pilosa L.	PAN	Th.
	Tagetes minuta L.	MED	Th.
	Senecio aegyptius L. var. *discoideus* Boiss.	MED	Th.
	Cichorium endivia L.subsp. *divaricatum*(schousb.)	MED, IR-TR	Th.
	Sonchus oleraceus L.	COSM	Th.
Najadaceae	*Najas marina* L. subsp. *armata* (Lindb. f.) Horn	MED, SA-SI	Hy.
Potamogetonaceae	*Potamogeton pectinatus* L.	COSM	Hy.
	Potamogeton crispus L.	COSM	Hy.
	Potamogeton perfoliatus L.	COSM	Hy.
	Potamogeton nodosus Poir.	MED, IR-TR	Hy.
Alliaceae	*Nothoscordum gracile* (Aiton) Stearn	N. TROP	G.
Pontederiaceae	*Eichhornia crassipes* (C. Mart.) Solms	COSM	Hy.
Juncaceae	*Juncus bufonius* L.	MED, SA-SI	Th.
	Juncus hybridus Brot.	MED, IR-TR	Th.
Lemnaceae	*Spirodela polyrhiza* (L.)Schleid.	COSM	Hy.
	Lemna gibba L.	COSM	Hy.
Typhaceae	*Typha domingensis* (Pers.) Poir. ex Steud.	PAN	Hy.
Gramineae	*Leersia hexandra* Sw.	MED, IR-TR, SA-SI	G.
	Lolium rigidum Gaudin	MED, IR-TR, EU-SB	Th.
	Poa annua L.	MED, IR-TR, EU-SB	Th.
	Avena barbata Pott ex Link subsp. *barbata*	MED, IR-TR	Th.
	Avena fatua L.	COSM	Th.

	Phalaris paradoxa L.	COSM	Th.
	Phalaris minor Retz.	MED, IR-TR	Th.
	Polypogon monspeliensis (L.) Desf.	COSM	Th.
	Polypogon viridis (Gouan)Breistr.	MED, IR-TR	Th.
	Bromus catharticus Vahl.	COSM	Th.
	Phragmites australis (Cav.) Trin. ex Steud. subsp. *australis*	PAL	Hy.
	Leptochloa fusca (L.) Kunth	PAL	G.
	Leptochloa panicea (Retz.) Ohwi	PAL	Th.
	Eragrostis cilianensis (All.) Vignolo ex Janch.	COSM	Th.
	Eleusine indica (L.) Gaertn.	PAL	Th.
	Dactyloctenium aegyptium (L.) Willd.	PAL	Th.
	Desmostachya bipinnata (L.) Stapf	SA-SI, S-Z	G.
	Cynodon dactylon (L.) Pers.	PAN	G.
	Panicum coloratum L.	S-Z	G.
	Echinochloa colona (L.) Link	PAN	Th.
	Echinochloa stagnina (Retz.) P. Beauv.	PAL	Th.
	Brachiaria reptans (L.) C.A. Gardner & C.E. Hubb.	PAL	Th.
	Paspalum distichum L.	PAL	Th.
	Setaria verticillata (L.) P. Beauv.	COSM	Th.
	Paspalidium geminatum (Forssk.) Stapf	PAL	Th.
	Digitaria ciliaris (Retz.) Koeler	PAL	Th.
	Cenchrus echinatus L.	SA-SI, S-Z	Th.
	Imperata cylindrica (L.) Raeusch.	PAL	G.
	Sorghum virgatum (Hack.) Stapf	S-Z	Th.
	Vossia cuspidata (Roxb.) Griff.	SA-SI, S-Z	Hy.
Cyperaceae	*Fimbristylis bisumbellata* (Forssk.) Bubani	PAL	Th.
	Cyperus alopecuroides Rottb.	PAN	Hy.
	Cyperus articulatus L.	PAL	G.
	Cyperus rotundus L. var. *rotundus*	PAN	G.
	Cyperus michelianus (L.) Delile subsp. *pygmaeus* (Rottb.) Asch. & graebn.	MED, IR-TR	G.
	Cyperus difformis L.	PAN	Th.

In a trial to understand the distribution of the species and the capability of their invasion to the islands of the Nile along the Egyptian territories, the present study at Beni-suef islands in addition to the available earlier studies in the islands of Aswan (Springuel, 1981) and Ali (2014), Qena (Hamed *et al.*, 2012), Minya (Mohamed & Hassan, 1998) and Cairo (Galal, 1994) were compared as shown in Table (2).

Table (2) summarized the chorological analysis of the recorded species in Beni-Suef Nile islands compared to the earlier northern and southern studied islands. For abbreviations, see Table (1).

CAIRO Lat. 30° 4′N Long 31° 17′ E	**BENI-SUEF Lat. 28° 36′N Long. 30° 36′ E**	**MINYA Lat. 28° 10′N Long 30° 1′E**	**QENA Lat. 26° 6′ 2N Long 32° 14′E**	**ASWAN Lat. 24° 5′ N Long 32° 54′E**	**Chorotypes**
% of Mono-regional species					
6.9	6	9	7.9	15.4	**S-Z**
2.7	6	3	3.9	1.1	**MED**
-	1.3	1	0.8	1.1	**SUD.**
0.7	0.7	-	2.4	3.2	**SA-SI**
1.4	0.7	3	4	6.6	**TRP**
-	0.7	-	-	-	**N.TRP**
% of Bi-regional species					
12.6	10.6	14	10.3	2.2	**MED, IR-TR**
-	2.6	-	4	3.3	**MED, SA-SI**
7	1.3	1	-	-	**MED, EU-SB**
3.5	6	4	7.9	18.7	**SA-SI, S-Z**
-	1.3	-	-	-	**IR-TR, SA-SI**
% of Tri-regional or morespecies					
9.1	9.9	7	1.6	1.1	**MED, IR-TR, EU-SB**
2.8	1.3	4	3.2	3.3	**MED, IR-TR, SA-SI**
28	26.5	25	19.8	18.7	**COSM**
17.6	15.2	14	14.3	13.2	**PAL**
11.9	10.6	13	17.5	12.1	**PAN**

4.Discussion

In this study, altogether 151 species belonging to 116 genera in 48 families of the vascular plants were recorded. The four major families based on the number of species were Poacaea, Asteraceae, Fabaceae and Brassicaceae. They comprised 44.4% of the total identified species. These families were reported earlier by Springuel (1981 & 1990), Mashaly *et al.,* (2009), Hamed *et al*., (2012) as the most frequent families in the studied Nile islands. Recently, Ali (2014) reported that the former three families were the dominant in the floristic composition of the Nile islands at Aswan. This observation was not restricted to the Nile islands but extended to agro-ecosystem in Egypt as reported by Shaheen (2002), Abd El-Ghani & Fawzy (2006).

This fact was also detected in the flora away of the Egyptian borders, among these:the tropics (Åfors, 1994; Becker *et al.,* 1998; Tamado & Milberg, 2000), the Mediterranean North African flora (Quézel, 1978) and the small-scale farming in highland Peru, central Mexico and northern Zambia (Åfors, 1994, Becker *et al.,* 1998and Vibrans, 1998).

The dominant life form in the flora of the studied area was therophytes represented by 86 species (c. 57%) followed by the hydrophytes (17.8%). As in the whole Egyptian flora, the therophytes were the most common life form (Hassib, 1951).The studied Nile islands were characterized by slightly saline soil and sufficient water supply accordingly therophytes and the hydrophytes were represented with higher percentages. Similar observation was cited by El-Ghareeb and Rezk (1989), they claimed that the therophytes acquired dominance in less saline and more sand habitats. Also, Heneidy and Bidak (2001) mentioned that the dominance of therophytes over the other life forms seemed to be a response to the hot dry climate, topographic variation and biotic influence. The dominance of these life forms also may be related to the human impact especially in the studied 14 cultivated islands. This postulation was supported by Grime (1979), who referred dominance of therophytes to the high level of disturbance, or human impact (Tzanoudakis *et al.,*2006).Similar observation was also recorded in urban flora of Central Europe (Kowarik, 1990), Berlin (Schmitz, 2000) and Vienna (Jackowiak, 1998).On the other hand, the relatively low number of perennials and trees, in the present study might be related to high intensity of disturbance due to agricultural activities in the cultivated islands;this fact also reported by Kim *et al*. (2002)and Abd El-Ghani *et al.*(2013).

The floristic composition of the studied seven inhabited cultivated islands showed higher number of species (species number ranged from 79 at Zawet El gedamy to 49 species at Baget Saleh) compared to the uninhabited cultivated islands (with lower species number that reached 33 species at Mansheyat Al-Sherka island). The high species number detected in inhabited islands was attributed to the presence of weeds associated with the cultivated crops. Similar observation were mentioned by Ali (2014) on the studied flora of the Aswan Nile islands. Earlier researchers related the increase in species number in inhabited islands to the habitat, topography, soil and water heterogeneity within communities (Pielou1969 & 1975, Nilsson *et al*., 1991 and Khedr & Lovett-Doust, 2000).

The chorological affinities of the recorded species showed that cosmopolitan taxa had the highest contribution (26.5%), followed by bioregional (21.8%), paleotropical (15.2%), tri-regional (11.2%) then monoregional. This result asserted the dominance of interregional species (bi, tri and pluri-regional species) over mono-regional ones, to the presence of inter-zonal habitats, such as anthropogenic or hydro-, halo- and pasmmophilous sites that confirmed by Zohary (1973).

Moreover, the widely distributed species belonging to cosmopolitan, palaeotropical and pantropical chorotypes constituted 79 species (52%). This indicated that the floristic structure of the study area was relatively simple as compared with other areas of Egypt, being more affected by human disturbances (Shaltout & El-Fahar, 1991 and Abd El-Ghani *et al*., 2011). Also this was supported by (El-Hadidi, 1993a) where he concluded that the major percentage of the weed flora of Egypt is represented by the widely spread cosmopolitan, palaeotropical and pantropical taxa.

The presence of species related to different chorotype categories was related earlier to the position of Egyptat the border line between the Asiatic and African continents, and its floristic composition showed affinities in all directions (Said, 1956). Also, El-Hadidi, (1993d) mentioned that the natural vegetation of Egypt belongs principally to Afro-Asiatic: Saharo– Sindian elements, African: Sudano – Zambazian elements, also Euro – Asiatic: Mediterranean elements and some taxa with western Asiatic affinities eventually Irano – Turanian elements.

The chorological analysis of the recorded species in Beni-Suef Nile islands compared to the earlier northern and southern studied islands cleared that the cosmopolitan elements decreased southwardly from 28% at Cairo to18.7 % at Aswan. Similar features were observed for the bioregional Med-Euro-Siberian and Med- Irano-Turanian elements. While the southern migrated species, the Sudano-Zambezian among them were decreased northwardly from 15.4% at Aswan to 6.9% at Cairo. Similarly the tropical elements decreased from 6.6% at Aswan to 1.4% at Cairo. This feature of species migration was noticed in the flora of Aswan Nile islands (Ali, 2014), El-Hadidi (1993c), who reported that the Mediterranean elements decreased southwardly in relation to the rain gradient while Hassan (1987) mentioned that the Sudano-Zambezian elements decreased northwards.

Some hydrophytic cosmopolitan species were traced along Nile islands from north to south, among them *Potamogeton pectinatus* L. and *Ceratophyllum demersum* L., these species were traced earlier in Aswan Islands by Springuel (1981) and Ali (2014),in Qena by Hamed *et al*. (2012), in Minya by Mohamed & Hassan (1998) and their northern records were in Cairo by Galal (1994).

Among the interest hydrophytic cosmopolitan species is the *Azolla* sp., the small floating aquatic fern introduced in the middle of 1990s, invaded and naturalized in irrigation canals of the farm lands in Nile delta, Faiyum, Minya and Assiut governorates (El Saadawi & Darwish, 1997). The present study traced *Azolla caroliniana* Willd. in Beni-Suef Nile islands. Also, *Lemna gibba* L. was traced in the study area. Future monitoring efforts should be carried out to trace the impact of *Azolla caroliniana* Willd. On *Lemna gibba* L. populations. This postulation based on the earlier observation by El Saadawi & Darwish (1997), who reported that the naturalized *Azolla* plant replaced the duck weed (Lemnaceae species).

But it could be noticed that there were five cosmopolitan species namely: *Verbena officinalis* L., *Setaria pumila* (Poir.) Roem. & Schult., *Nasturtium officinale* R. Br., *Chenopodium ficifolium* Sm. and *Bergia capensis* L. that traced north to the study area in Cairo and neither reached the study area nor migrated more southwards, this supported by other workers on the southern Nile islands (Springuel, 1981,Mohamed & Hassan 1998, Hamed *et al*., 2012,andAli, 2014).

The present study revealed three Palaeotropical species traced as common species in all islands (from south to north) these were: *Phragmites australis* (Cav.) Trin. Ex Steud. subsp. *australis*, *Imperata cylindrica* (L.) Raeusch., and *Glinus lotoides* L. this was also confirmed by Springuel (1981), Mohamed & Hassan (1998),Hamed *et al*. (2012) andAli (2014); and their northern records were in Cairo by Galal (1994). At the contrary, three Palaeotropical species; *Xanthium spinosum* L., *Samolus valerandi* L. and *Dichanthium annulatum* (Forssk.) Stapf recorded in Cairo islands (Galal, 1994) north to the study area and could not migrate southwards.

The four Panotropical species: *Eclipta prostrata* (L.) L., *Echinochloa colona* (L.) Link, *Cyperus rotundus* L. var. *rotundus* and *Cyperus alopecuroides* Rottb. Were among the traced species in the study area that were recorded in all Nile islands (Springuel, 1981, Galal, 1994, Mohamed & Hassan 1998, Hamed*etal*., 2012 and Ali, 2014).

Among the interested features of the recorded species were the Mediterranean elements, some species that migrated southwards stopped at Qena (Hamed *et al*., 2012), among them: *Malva parviflora* L., *Conyza bonariensis* (L.) Cronquist, *Emex spinosa* (L.) Campd., *Polypogon viridis* (Gouan) Breistr., *Potamogeton nodosus* Poir. And *Cichorium endivia* L. subsp. *Divaricatum* (Schousb.) P.D. Sell.

At the contrary, other Mediterranean species stopped migration at Beni-Suef islands as *Orobanche cernua* Loefl., *Avena barbata* Pott ex Link subsp. *barbata*, *Silybum marianum* (L.) Gaertn. var. *marianum*, *Vicia sativa* L. subsp. *Sativa*, *Lolium rigidum* Gaudin, *Urtica urens* L., *Enarthrocarpus lyratus* (Forssk.) DC., *Fumaria parviflora* Lam. and *Sinapis allionii* Jacq. On the same line, there were other species as *Urospermum picroides* (L.) F. W. Schmidt, *Lolium multiflorum* Lam., *Ammi visnaga* (L.) Lam. And *Chenopodium botrys* L., *Coronopus squamatus* (Forssk.) Asch., *Urospermum picroides* (L.) F. W. Schmidt, *Lolium multiflorum* Lam., *Chenopodium botrys* L. that stopped migration at Cairo Nile islands (Galal, 1994) and not recorded in southern islands (Springuel, 1981 Mohamed & Hassan, 1998, Hamed *et al*., 2012and Ali, 2014).

Sudano-Zambezian species behaved in a different way. Some migrated northwardly to Cairo among them: *Persicaria senegalensis* (Meisn.) Soják, *Ludwigia stolonifera* (Guill. & Perr.) P. H. Raven, *Sphaeranthus suaveolens* (Forssk.) DC. var. *abyssinicus* (Steetz) Ross-Craig, *Sesbania sesban* (L.) Merr. and *Oxystelma esculentum* (L.f.)R. Br. (Galal, 1994). On the other hand, other Sudano-Zambezian species as *Vahlia dicotoma* (Murray) Kuntze and *Erucastrum arabicum* Fisch. & C.A. Mey. had not reached Minya islands yet. This was confirmed by Mohamed & Hassan (1998).Some other Sudano-Zambezian species stopped at Aswan and didn't migrate northwardly as *Vahlia geminiflora* (Del.) Bridson, *Vahlia digyna* (Retz.) Kuntze, *Najas pectinata* (Parl.) Magn.,*Heliotropium supinum* L. and *Faidherbia albida* (Del.) Chiov., *Indigofera oblongifolia* Forssk., *Cocculus pendulus* (J.R. & Forst.) Diels, *Balanites aegyptiaca* (L.) Del. and *Leptadenia arborea* (Forssk.) Schweinf. These species recorded only at Aswan Nile islands decades ago by Springuel (1981)and recently by Ali (2014); while the studies in the northern islands revealed that they were not recorded there, Hamed *et al*., (2012) in Qena, Mohamed & Hassan (1998) in Minya, this study in Beni-Suef and Galal (1997) in Cairo.

Populus euphratica Oliv. is a naturalized female tree in Siwa Oasis (Boulos 2009). It was traced in the study area. Its presence might related to its cultivation by cuttings, this was mentioned by Hassan (2008).

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