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Updating the checklist of the alien flora in Egypt

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Abstract:

The present study aims to update the list of the alien species in the Egyptian flora, which prepared from literature reviewing, field trips and herbaria consultation. The recent list includes 250 taxa (11.7% of the Egyptian flora); including 5 subspecies and two varieties; related to 161 genera and 41 families. Three states of alien species are recognized: casuals (114 taxa), naturalized (129 taxa) and, invasive (7 taxa). The most represented life form is the therophytes. On the other hand, four geophytes-helophytes and three hydrophytes. Four major habitats supporting the distribution of these species: cultivated land, wetland, ruderal and natural habitats. The cultivated lands are the most represented. These alien taxa belong to 16 origins: 12 in the Old World (with 156 taxa) and four origin belong to New World (with 117 taxa), Pantropic (with four taxa) and palaeotropics (with 11 taxa). The same taxon may have more than origin. The most represented taxa were from South and Tropical America (58 taxa = 23.2 %), South Asia (51 taxa = 20.4 %) followed by Europe (38 = 15.2 %). The highest taxa were recorded in family Poaceae (74), Amaranthaceae s.l. (25), Fabaceae (23), Asteraceae (20), Solanaceae (16) followed Euphorbiaceae (10 taxa).

Key words: casual species, Egypt, Invasive species, Naturalized species, New World, Old World, Urban habitats.

Introduction:

An alien plant is referred to as exotic, introduced, foreign, non-indigenous or non-native plant. It has been introduced by humans intentionally or otherwise through human agency or accidentally from one region to another. An alien plant that has escaped from its original ecosystem and is reproducing on its own in the regional flora is considered a naturalized species (Lal, 2012). Many non-indigenous plant species have become components of the flora of any country. In Egypt, the studies of Shaltout (2014) could be considered as an introductory step towards studying this alien flora in Egypt.

The expanding field of invasion ecology has seen a proliferation of terms to describe various concepts. Alien species are not indigenous in a given geographical unit (i.e. country), regardless of their origin. In this context, an alien species can be native of another country, or native of another continent. In the present study three alien categories were identified as follow: 1- Casual; alien plants that may flourish and even reproduce occasionally in an area, but which do not form self-replacing populations, and which rely on repeated introductions for their persistence (includes taxa labeled in the literature as adventives, waifs, transients, occasional escapes and persisting after cultivation). 2- Naturalized species; alien plants that reproduce consistently (casual) and sustain populations over many life cycles without direct intervention by humans; they often reproduce offspring freely, usually close to adult plants, and do not necessarily invade natural, semi-natural or human-made ecosystems. 3- Invasive species; naturalized plants that produce reproductive offspring, often in very large numbers, at considerable

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distances from parent plants (approximate scales: > 100 m; over < 50 years for taxa spreading by seeds and other propagules; > 6 m over 3 years for taxa spreading by roots, rhizomes, stolons, or creeping stem), and thus have the potential to spread over a considerable area. (Richardson *et al.*, 2000).

The present study aims to achieve these points: updating and improvements the checklist of the alien taxa in the Egyptian flora previously prepared by Shaltout (2014), and providing an analysis of its origin and geographical patterns of the recorded taxa.

Study Area

Egypt lies between Africa and Asia, with long coast along Mediterranean Sea in the north (some 970 km) and the Red Sea in the east (some 1100 km). It occupies the northeastern corner of the African continent between Longitude: 30° 47' E and Latitude: 26° 50' N. It is roughly quadrangular, extending about 1073 km from north to south, and about 1229 km from east to west. Thus, its total area approximates one million km². About quarter of its area lies to the south of the Cancer Tropic. This latitudinal location means that most of Egypt falls within Africa's dry desert region, except the narrow northern strip, which experiences a Mediterranean climate (Zahran and Willis, 2009).Its climate is affected by hot dry air masses over the Sahara, and the cooler, damper maritime air masses from the north (carried by east-ward moving depressions). Throughout most of the year, the hot dry tropical continental air masses dominate, but during the winter period air masses of both tropical and polar maritime origin make brief incursions into Egypt from the north, frequently bringing rain with them. It is characterized by a hot and almost rainless climate (Mashaly 1987, Zahran and Willis 2009).

Materials and Methods:

1-Number and Categories of Alien Taxa:

a- Literature review:

A previous list of 137 alien species in the Egyptian flora was prepared by Shaltout (2014). After consulting the following literature: Täckholm (1956 and 1974), Boulos & El Hadidi (1974), El-Hadidi and Fayed (1995), El-Hadidi and Hosni (2000) and Boulos (1999, 2000, 2002, 2005 and 2009) a new list was prepared. These references classified the alien species into three categories: casual, naturalized and Invasive according to Shaltout *et al.* (2016).

b- Field trips:

The taxa under study have been collected during 40 field trips in Egypt during the period from spring 2011 to winter 2018, covering some natural and anthropogenic habitat from phytogeographical regions: Nile Delta, Nile Valley, Faiyum depression, Oases, Mediterranean coastal region, Eastern and Western Deserts, **(Fig. 1).** The identification of the specimens was confirmed using the keys in the available references (Täckholm, 1974, Boulos, 1999-2005), and comparing them with specimens housed at the Herbaria of Tanta (TANE), Cairo University (CAI) and Agricultural Research Center (CAIM). All herbarium sheets were electronically scanned.

c- Herbaria consultation:

The species that the author could not collect from the field or from the previous literature were checked as herbarium specimens in the following herbaria: TANE, CAI and CAIM.

2-Life Form:

The life forms of the alien taxa were identified following the well-known system of Raunkiaer (1934). The life forms were as follows: phanerophytes, chamaephytes, hemicryptophytes, cryptophytes (geophytes, helophytes, or hydrophytes), therophytes and parasites.

3- Habitat:

The habitats of the alien species were detected by the author in the field during the field trips and the missing data were collected from relevant taxonomic literature such as Zohary (1966 and 1972), Feinbrun-Dothan (1978 and 1986), El-Hadidi & Fayed (1995), Boulos (1999 - 2009), Ahmed (2009) and Shaltout *et al.* (2010).

4-Native Range:

The origin of alien species were detected by checking previously published floras including: Forsskål (1775), Delile (1813), Boissier (1867-1882), Ascherson and

Fig. 1 Map of Egypt showing the visited areas (•).

Schweinfurth (1887 and 1889), Sickenberger (1901), Muschler (1912), Täckholm *et al.* (1941); Täckholm & Drar (1950-1969), Täckholm (1956 and 1974), Bleser-Bircher (1998), El Hadidi & Boulos (1988); Hepper (1998), Xuxley E. (1999); Boulos (1999-2009); and Ibrahim *et al.* (2016). Other regional Floras includes**:** Davis (1965-1985); Davis *et al.* (1988), Zohary (1966 - 1972); Feinbrun-Dothan (1978-1986); and Meikle (1977-1985)

The accepted names by stuff of CAI and TANE following the International Plant Names Index (https://www.ipni.org/, https://www.tropicos.org) and World Checklist of selected Plant Families (https://wcsp.science.kew.org); affiliation of taxa to families followed the approach of the Angiosperm Phylogeny Group (Stevens 2001 onwards, APG IV 2016). All herbarium specimens were scanned and kept in Herbarium of Tanta University (TANE).

Results:

1- Number and categories of the Alien Species

The alien flora of Egypt comprises 250 taxa (Appendix); three categories are recognized: causals, naturalized, and invasive. The naturalized taxa (129 taxa = 52.0%) are the most represented, followed by the causals (114 taxa = 45.6%), while the invasive species (7 taxa = 2.8%) less represented. One hundred and thirty- two of the total alien taxa were intentionally introduced, while 118 species were accidentally introduced. The intentional taxa are most concentrated in the casual category (89 taxa = 35.6%), while the accidental species are most represented in naturalized category (96 taxa = 38.4%), but all the invasive taxa are intentionally introduced, fig. (2).

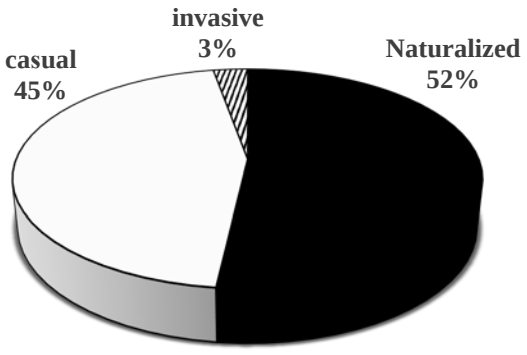

Fig. (2). Percentage number of alien species in the different recognized categories

2-Taxic Diversity:

Pteridophyta are represented by only one family (Azollaceae) and one species; while Eudicots are represented by 37 families, 161 genera and 230 species; the richest families are Poaceae: 74 taxa, Amaranthaceae (incl. Chenopodiaceae: 25 taxa) Fabaceae: 23 species, Asteraceae: 20 taxa, Solanaceae (16 taxa), and Euphorbiaceae (10 taxa), fig. (3).

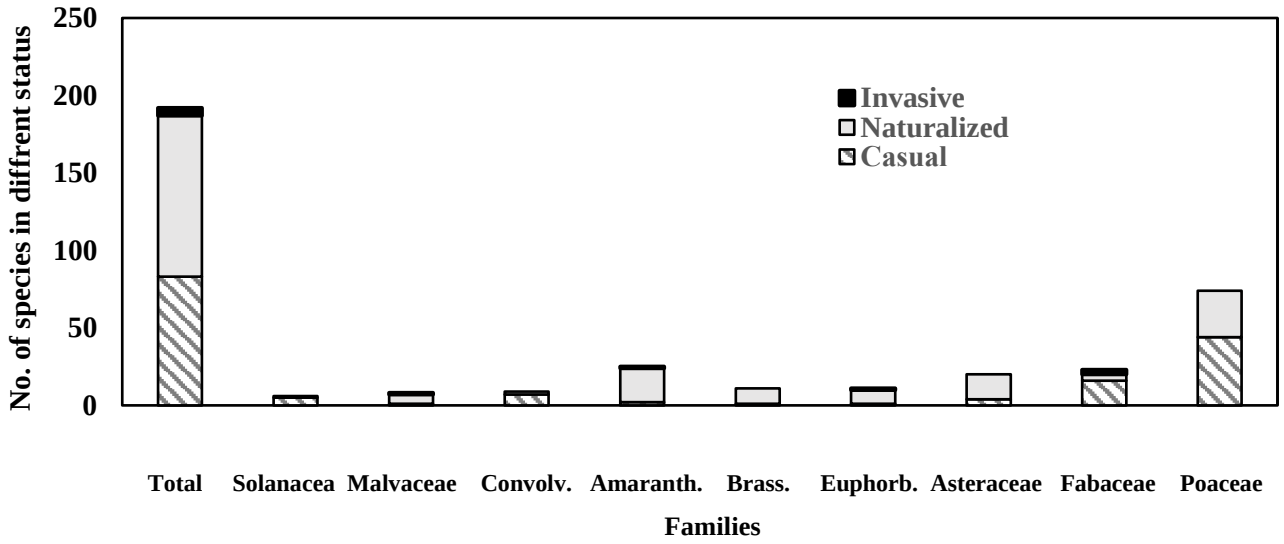

Fig. (3). Number of alien species in different families with more than 5 species in the three categories of the alien species in the Egyptian flora

3. Life Form:

Therophytes are the most represented life form (136 species = 54.4% of the total species), followed by phanerophytes (41 taxa = 16.4%) and geophytes (32 taxa = 12.8%). Hemicryptophytes are represented by 20 taxa (8%), chamaephytes by 12 taxa (4.8%). Most of the phanerophytes (20 taxa out of 41) and geophytes (24 taxa out of 32) are in the casual category (Fig. 4), while therophyte (80 taxa out of 136) and hemicryptophytes (12 taxa out of 20) are in casual category. Chamaephytes (7 taxa out of 12) and Geophyte-Helophyte (3 taxa out of 4) are mostly naturalized species. On the other hand, two of the three hydrophytes are invasive species.

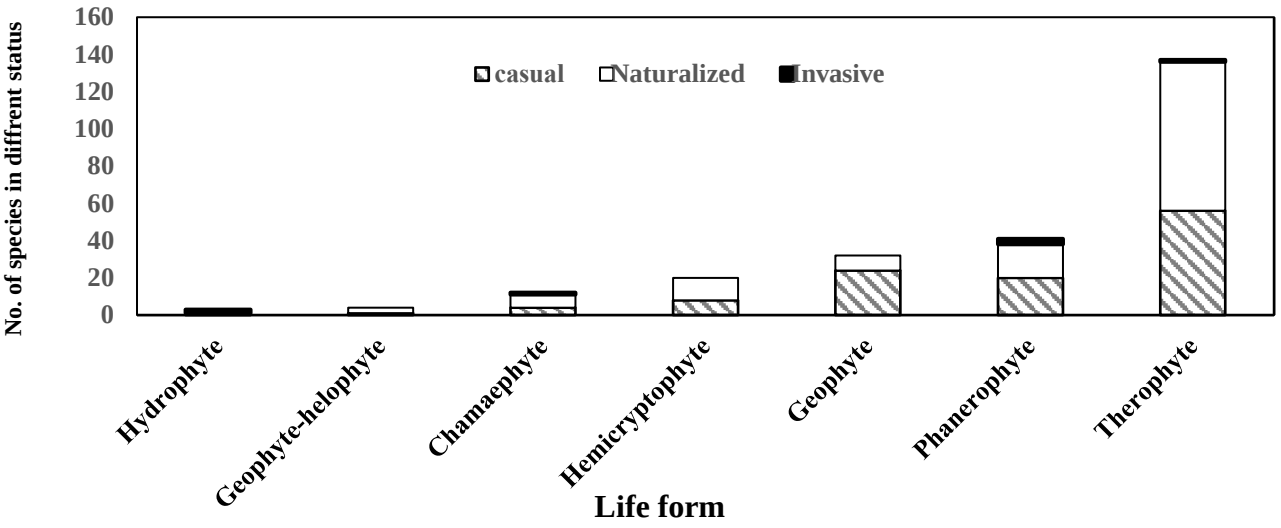

Fig. (4). Number of alien taxa in relation to their life form and alien category in the Egyptian flora

4- Habitat:

Twenty-three habitats supporting the distribution of alien species in Egypt. They are categorized into four groups of habitats as follow, cultivated land are the most represented (155 species = 52.5%), wetland, ruderal and natural habitat are the less represented (22 taxa = 7.4%), table (1).

Table 1. Number of the alien plant taxa in their habitats in the Egyptian flora. Ac: absolute number and Rc: relative number (%). Habitats are according to Shaltout et al (2016).

Habitat	Casual	Naturalized	Invasive	Alien	
				Ac	Rc %
Cultivated land	79	73	3	155	62
Wetland	23	40	3	66	26.4
Ruderal	12	36	4	52	20.8
Natural	6	15	1	22	8.8

5-Native Range:

The alien taxa in the Egyptian flora belong to 24 origins divided into 12 origins in the Old World and 4 origins in the New World. One hundred and fifty- six taxa from the Old World distributed as follows: 87 from Asia, 38 from Africa, 38 from Europe and 10 from Mediterranean and 3 from Middle East; while 117 taxa from the New World distributed as follows: 104 of American origin and 13 of Australian origin, 4 Pantropic and 11 taxa palaeotropic (Table 2). The same taxon may have more than origin; four species with uncertain origin (*Apium graveolens, Triticum aestivum and Laphangium luteoalbum*) and two are cosmopolitan (*Xanthium strumarium* and *Rorippa palustris*).

Table 2. Number of alien taxa with their origin. N: north, S: South, W: West, E: East, T: Tropical and C: Central. Ac: absolute number and Rc: relative number (%).

	Origin	Ac	Rc %
Old World	N. Africa	3	1.2
	T. Africa	18	7.2
	S. Africa	11	4.4
	W. Africa	2	0.8
	E. Africa	4	1.6
	N. Asia	4	1.6
	S. Asia	51	20.4
	W. Asia	10	4
	E. Asia	2	0.8
	Middle East	3	1.2
	Europe	38	15.2
	Mediterranean	10	4
	Pantropic	4	1.6
	Palaeotropic	11	4.4
New World	N. America	23	9.2
	S. & T. America	58	23.2
	C. America	23	9.2
	Australia	13	5.2
Uncertain		4	1.6
Cosmopolitan		2	0.8

Discussion:

National inventories of alien plants are one of the key components for evaluating the status of biodiversity in a given country, as well as threats to endangered taxa, and provide source data for creating relevant indicators (Lambdon *et al.* 2008, Celesti- Grapow *et al.* 2010, Pyšek *et al.* 2012, van Kleunen *et al.* 2015, Latombe *et al.* 2016. Such data are needed for early warning systems, prioritization of management and implementation of effective policy measures (Brunel *et al.* 2010). The publication of checklists also helps neighboring countries to assess the threat from potential invasions of new taxa to arrive and checklists can contribute to the so-called horizon scanning exercises looking for potential new threats (Roy *et al.* 2014, Latombe *et al.* 2017).

This is the second comprehensive compilation and analysis of the available records on the alien plant taxa in Egypt. It provides the first assessment of their status, introduction purposes and main types of invaded habitats. It also pinpoints knowledge gaps in the geographic distribution and the quantification of environmental and economic impacts. The recorded alien taxa in the present study are 250 related to 161 genera and 41 families; they represent 11.7% of the total Egyptian flora; which are relatively low compared with the other countries. In Italy, 8043 taxa were recorded (Bartolucci et al. 2018), while France had 732 taxa, Spain had 495 taxa, Portugal had 261 taxa (Lambdon *et al.* 2008) and 340 in Turkey (Uludağ *et al.* 2017). In Egypt, forty one taxa were not recorded in the checklist of Boulos (2009) these including 29 casual, 9 naturalized and 3 invasive taxa. The first study by Shaltout *et. al* (2016) recorded 137 alien taxa related to 92 genera and 30 families. They represent 6.2% of the total Egyptian flora. The present study indicates the dynamic pattern of the alien species in the Egyptian flora. One of the interpretations for the relatively low ratio for Egypt is the relatively short period used in the present study, which covers some 250-300 years only (since 1775 until now). This period is not long enough to include the history and evolution of the Egyptian flora.

In a country of ancient civilization like Egypt, it is impossible to decide definitely if the majority of weeds have originated from the native flora or have been introduced by man`s activity; there is no doubt that some weed species are really native to Egypt (Hassib 1951). Shaltout (2014) classified the alien species into five categories as follows: casuals, naturalized, environmental weeds, invasive and transformers. In the present study three main categories were adopted as follows: casual, naturalized and invasive species as proposed by Shaltout *et al* (2016). The result of the present study indicates that the cultivated lands have alien taxa higher than the other habitats (155 taxa), this may be attributed to high human activity. Detailed knowledge of the pool of alien naturalized taxa from which emerging invaders recruit can provide national authorities in Egypt with an instrument for prioritization of management measures and allocation of resources to those species where future spread, environmental and socioeconomic impacts are likely to occur (Brunel *et al.* 2010, Pergl *et al.* 2016, Rumlerová *et al.* 2016).

The life form spectrum is thought to be either hereditary adjustment to the environment (El–Demerdash 1984), or representing the residual effects of some historical, climatic or biotic conditions on the plant population (Waisel 1972) As in case of the whole Egyptian flora, most of the alien species in the present study are therophytes followed by the phanerophytes. This trend is comparable to the whole flora of Egypt. The dominance of therophytes over the other life forms seems to be a response to the hot–dry climate, topographic variation and biotic influence (Heneidy and Bidak 1999).

The native range of the alien species in the present study belongs to 20 origins divided into 14 old world origins and the 6 new world origins. Severe invasions were due to the old world origins (171 species) as follows: Asia > Africa > Europe > Mediterranean region while the new world origins made fewer invasions (117 species) as follows: South America > North America > Australia. This may be

interpreted in the view that the old world has been in close contact with Egypt since ancient history. In addition, the plant biodiversity in the old world are richer than that of the new world, which facilitates plant exchange. Although the new world is recently contacted with the old world (some 500 years, after the discovery of America); the number of species that invaded Egypt from it is not small in comparison with the number of alien species that came from other continents of the world.

The results of the present study may increase the awareness of alien taxa in Egypt and neighboring countries and trigger further dedicated specialized studies (e.g. Blackburn et al. 2014, Nentwig et al. 2016).

Conclusion:

In conclusion, the present study may provide information on the number and status of alien taxa to fill a gap with respect to these taxa in Egypt. It revealed that the total number of the alien taxa in the Egyptian flora was 250 species, belonging to 106 genera and 31 families; this contributes 11.7% of the total flora of Egypt; most of these taxa are of South American origin (23.6% of the total alien flora) and of South Asian origin (20.8 %). Therophytes were the most represented life form, followed by phanerophytes; geophytes-helophytes was the less represented. Four major groups of habitats supporting the distribution of alien species in Egypt: cultivated, wet land, ruderal and natural habitats Further studies are needed to report the spreading of newly introduced, and naturalized taxa which may arrive and spread in Egypt, causing serious problems and affected the ecosystem. Thus, we hope that publishing this list will encourage further recording so that the impacts of these species can be minimized and controlled.

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Appendix: Characteristics of the alien taxa in the Egyptian flora. (Vernacular name after Täckholm 1974). The species that was not recorded in the checklist of Boulos (2009) was marked by (*). The taxa are arranged in Alphabetical order. (E: East; C: Central; S: South; T: Tropical; W: West; SE: Southeast; SW: Southwest; TS: Tropical-South, TW: Tropical west, TE: Tropical east; Temp.: Temperate)

Scientific name	Vernacular name	Family	Life form	Native range
Casual				
*Acacia farnesiana** (L.) Willd.	فتنه	Fabaceae	Phanerophyte	T. & subtropical America
Ageratum houstonianum Mill.	-	Asteraceae	Therophyte	C. America
Alcea rosea L.	خطمية	Malvaceae	Hemicryptophyte	E. Asia
Allium cepa L.	بصل	Amaryllidaceae	Geophyte	W. Asia
Allium sativum L.	ثوم	Amaryllidaceae	Geophyte	C. Asia
Alternanthera pungens Kunth	-	Amaranthaceae	Hemicryptohyte	S. America
Althaea ludwigiu L.	خطمة	Malvaceae	Therophyte	S. Africa
Apium graveolens L.	كرفس	Apiaceae	Therophyte	Unknown
Artemisia scoparia Waldst. & Kit.	-	Asteraceae	Therophyte	Europe, Temp. Asia
Arundo donax L.	غاب بلدى	Poaceae	Geophyte-Helophyte	Mediterranean
Avena sativa L.	زمير	Poaceae	Therophyte	Middle East
*Bauhinia variegata** L.	خف الجمل	Fabaceae	Phanerophyte	S. Asia (India & China)
Beta vulgaris subsp. *maritima* (L.) Arcang.	بنجر	Amaranthaceae	Therophyte	Europe, N. Africa, and S. Asia
*Brassica oleracea** var. *oleracea*	كرنب	Brassicaceae	Therophyte	W. Europe
Brassica rapa L.var.*rapa*	لفت	Brassicaceae	Therophyte	N. Europe, E. Asia
Briza maxima L.	-	Poaceae	Therophyte	S. Africa
Briza minor L.	-	Poaceae	Therophyte	Mediterranean
Bromus lepidus Holmb.		Poaceae	Geophyte	Europe
*Casuarina equisetifolia** L.	جزوارين	Casuarinaceae	Phanerophyte	SE Asia to NE Australia and Pacific Islands
*Casuarina stricta** L.	جزوارين	Casuarinaceae	Phanerophyte	SE Australia
Cenchrus americanus (L.) Morrone	ذيل الفار	Poaceae	Therophyte	Palaeotropical
Cenchrus ciliaris L.	رجل الغراب	Poaceae	Hemicryptophyte	Palaeotropical
Cenchrus clandestinum (Hochst. ex Chiov.) Morrone	-	Poaceae	Geophyte	T, Africa
Cenchrus longisetus M.C.Johnst.	-	Poaceae	Geophyte	E. Africa and Arabia.
Centaurea calcitrapa L.	شوك	Asteraceae	Chamaephyte	Middle East, C. Europe
Chloris virgata Sw.	-	Poaceae	Therophyte	Palaeotropical
Chrysopogon zizanioides (L.) Roberty	نجيل الهند	Poaceae	Geophyte	S. Asia (India)
*Citrullus lanatus** (Thunb.) Mastum & Naki	بطيخ	Cucurbitaceae	Therophyte	Pantropical
Clitoria ternatea L.	عرق العقرب	Fabaceae	Phanerophyte	S. Asia
Coix lacryma-jobi L.	دموع أيوب	Poaceae	Therophyte	S. Asia
Coriandrum sativum L.	كزبرة	Apiaceae	Therophyte	S. Europe
Cortaderia selloana (Schult. &Schult.f.) Asch. & Graebn.	حلفا	Poaceae	Geophyte	S. America (Brazil, Argentina, Paraguay)
Cotula anthemoides L.	-	Asteraceae	Therophyte	Palaeotropical

Scientific name	Vernacular name	Family	Life form	Native range
*Cucumis melo** L.	خيار	Cucurbitaceae	Therophyte	Probably from W. Africa
*Cucurbita pepo** L.	قرع عسلي	Cucurbitaceae	Therophyte	Probably from N. America
Cyclosprmum leptophyllum (Pers.) Sprague		Apiaceae	Therophyte	C. America
Cymbopogon citratus (DC.) Stapf	حشيشة الليمون	Poaceae	Geophyte	S. Asia (S. India & Sri Lanka)
Cymbopogon flexuosus (Nees ex Steud.) Watson	حشيشة الليمون	Poaceae	Geophyte	S. Asia (India)
Cymbopogon jwarancusa (Jones) Schult.	-	Poaceae	Geophyte	S. Asia (India)
Cymbopogon martini (Roxb.) J. F. Watson in Atkins.	-	Poaceae	Geophyte	S. Asia (India)
Cymbopogon nardus (L.) Rendle	-	Poaceae	Geophyte	S. Asia
Cyperus involucratus Rottb.	-	Cyperaceae	Geophyte	T. Africa
Dactylis glomerata L.	-	Poaceae	Geophyte	N. Asia & Europe
*Desmodium tortuosum** (Sw.) DC.	-	Fabaceae	Therophyte	T. America
Ehrharta calycina Sm.	-	Poaceae	Geophyte	S. Africa
Eleusine coracana (L.) Gaertn.	بشنه	Poaceae	Therophyte	S. America and S. Asia (India)
Eleusine floccifolia (Forssk.) Spreng.	-	Poaceae	Geophyte	NE T. Africa and SW Arabia
Eleusine indica (L.) Gaertn.	نجيل	Poaceae	Therophyte	S. Asia (India)
Elodea canadensis Michx.	الوديا	Hydrocharitaceae	Hydrophyte	N. America
Eragrostis tef (Zucc.) Trott.	-	Poaceae	Therophyte	E. Africa (Ethiopia)
*Eruca vesicaria** (L.) Cav.	جرجير	Brassicaceae	Therophyte	Middle East-West Asia
*Eucalyptus camaldulensis** Dehn.	كافور	Myrtaceae	Phanerophyte	Australia
Euphorbia nutans Lag.	-	Euphorbiaceae	Therophyte	N. America
Ficus retusa L. *	فيكس	Moraceae	Phanerophyte	S. Asia (Philippines to N Borneo)
Foeniculum vulgare Mill. subsp. *vulgare*	شبت	Apiaceae	Hemicryptophyte	Europe
Gisekia pharnaceoides L.	-	Gisekiaceae	Therophyte	Palaeotropical
Hedysarum coronarium L.	-	Fabaceae	Therophyte	Europe (Italy)
Heliotrobium curassavicum Vahl	-	Boraginaceae	Chamaephyte	T. America
*Hibiscus esculentus** L.	بامية	Malvaceae	Phanerophyte	S. Asia
Hibiscus sabdariffa L.	كركديه	Malvaceae	Therophyte	S. Asia and (Africa)?
Hordeum vulgare L.	شعير	Poaceae	Therophyte	S. Asia (India)
Ipomoea cairica (L.) Sweet	ست الحسن	Convolvulaceae	Geophyte	T. Africa and S. Asia
*Khaya senegalensis** (Desv.) A. Juss	كايا	Meliaceae	Phanerophyte	TW Africa
*Lablab purpureus** (L.) Sweet.	لبلاب	Fabaceae	Chamaephyte	T. Africa
Lepidium draba L.	-	Brassicaceae	Hemicryptophyte	S. Europe
Lepidium sativum L.	حب الرشاد	Brassicaceae	Therophytes	Eastern Mediterranean to S Asia (India)
Linum usitatissimum L.	كتان	Linaceae	Therophyte	Europe
*Luffa cylindrica** (L.) M. Roem.	لوف	Cucurbitaceae	Phanerophyte	S. Asia & T/ Africa
Lupinus albus Schreb.	ترمس	Fabaceae	Therophyte	S. Europe
*Lycopersicon esculentum** P. Mill.	طماطم	Solanaceae	Hemicryptophyte	T. America
*Mangifera indica** L.	مانجو	Anacardiaceae	Phanerophyte	N. America
Medicago sativa L.	نفل	Fabaceae	Therophyte	W. Asia

Scientific name	Vernacular name	Family	Life form	Native range
Melinis minutiflora P. Beauv.	-	Poaceae	Geophyte	T. Africa
Melinis repens (Willd.) Zizka subsp. *grandiflora* (Hochst.) Zizka	-	Poaceae	Therophyte	T. Africa
Mentha pulegium L.	نعناع	Lamiaceae	Chamaephyte	W. and C. Europe, Middle East, N. Africa
Mimosa pigra L.	-	Fabaceae	Phanerophyte	S. America
Miscanthussinensis Anderson	-	Poaceae	Geophyte	Europe & SE Asia (China, Japan, Korea)
Momordica balsamina L.	-	Cucurbitaceae	Therophyte	Palaeotropcal
*Morus alba** L.	توت ابيض	Moraceae	Phanerophyte	S. Asia (China)
*Morus nigra** L.	توت أسود	Moraceae	Phanerohyte	SW Asia
Nigella sativa L.	حبة البركة	Ranunculaceae	Therophyte	W. & S. Asia (India)
Oryza sativa L.	أرز	Poaceae	Therophyte	SE Asia
*Parkinsonia aculeata** L.	شوكة القدس	Fabaceae	Phanerophyte	T. America
Paspalum racemosum Lam.		Poaceae	Therophyte	S. America
Petroselinum crispum (Mill.) A. W. Hill.	بقدونس	Apiaceae	Therophyte	Europe, W. Asia
Phalaris aquatica L.	-	Poaceae	Geophyte	Mediterranean
Pisum sativum L.	بسلة	Fabaceae	Therophyte	Europe
*Psidium guajava** L.	جوافة	Myrtaceae	Phanerophyte	T. America
*Raphanus sativus** L.	فجل	Brassicaceae	Therophyte	Europe
Rorippa palustris (L.) Besser	-	Brassicaceae	Therophyte	Subcosmopolitan
Saccharum officinarum L.	قصب السكر	Poaceae	Geophyte	S. & SE Asia
*Schinus terebinthifolius** Raddi.	فلفل عريض	Anacardiaceae	Phanerophyte	S. America (Brazil to Argentina)
Sesbania sericea (Willd.) Link	-	Fabaceae	Therophyte	T. Africa
Setaria italic (L.) P. Beauv.	-	Poaceae	Therophyte	Europe
Sida acuta Burm.f.	-	Malvaceae	Geophyte	Pantropical
*Solanum diphyllum** L.	-	Solanaceae	Phanerophyte	C. America
*Solanum melongena** L.	باذنجان	Solanaceae	Phanerophyte	S. Asia and S. Africa
Sorghum bicolor (L.) Moench		Poaceae	Therophyte	S. Africa
Sorghum halepense (L.) Pers.	حشيش الفرس، جراوة	Poaceae	Geophyte	Mediterranean
Sorghum x drummondi (Nees ex Steud.) Millsp. & Chase	-	Poaceae	Therophyte	Cultivated in the old world tropic
Sporobolus natalensis (Steud.) T. Durand & Schinz	-	Poaceae	Hemicryptophyte	S. Africa
Sporobolus wrightii Munro ex Scribn.	-	Poaceae	Geophyte	N. & C. America
Themeda villosa (Poir.) A. Camus in Lecomte		Poaceae	Hemicryptophyte	SE Asia
Trifolium incarnatum L.	-	Fabaceae	Therophyte	S. Europe
*Trigonella foenum-graecum** L.	حلبة	Fabaceae	Therophyte	SW Asia
Triticum aestivum L.	قمح	Poaceae	Therophyte	Not known?
Triticum dicoccum (Schrank) Schubl.	قمح	Poaceae	Therophyte	S. and E. Europe, Temp. Asia
Urochloa mutica (Forssk.) T.Q.Nguyen	مضيد	Poaceae	Therophyte	Pantropical
*Vicia faba** L.	فول	Fabaceae	Therophyte	N. Africa, SW Asia
Vigna unguiculata (L.) Walp subsp.*Sesquipedalis* (L.) Verdc.	لوبيا	Fabaceae	Therophyte	T. Africa (uncertain)
Viola tricolor L.	بانسية	Violaceae	Therophyte	Europe

Scientific name	Vernacular name	Family	Life form	Native range
*Vitis vinifera** L.	عنب	Vitaceae	Phanerophyte	Mediterranean, SW Asia, C. Europe
Zea mays L.	ذرة شامى	Poaceae	Therophyte	C. America
Zea mexicana (Schard.) Reeves &Mangelsd.	ذرة ريانه	Poaceae	Therophyte	C. America (Mexico)
Naturalized				
Abutilon theophrasti Medik.	حنبوك	Malvaceae	Therophyte	Palaeotropical
Acrachne racemosa (B. Hyne ex Roem. & Schult.) Ohwi	-	Poaceae	Therophyte	T. Africa
Alopecurus myosuroides Huds.	ثعلبية	Poaceae	Therophyte	S. Europe
*Alternanthera bettzickiana** (Regel) Voss	-	Amaranthaceae	Therophyte	C. and S. America (Maxico and Argentina)
*Alternanthera nodiflora** R.Br.	-	Amaranthaceae	Therophyte	T. Africa & S. Asia
Amaranthus albus L.		Amaranthaceae	Therophyte	N. America
Amaranthus blitoides S. Watson	-	Amaranthaceae	Therophyte	W. of N. America
Amaranthus caudatus L.	عرف الديك	Amaranthaceae	Therophyte	S. America
Amaranthus cruentus L.	رعاف	Amaranthaceae	Therophyte	T. America
Amaranthus hybridus L.	رعاف	Amaranthaceae	Therophyte	N. America
Amaranthus lividus L.	-	Amaranthaceae	Therophyte	Pantropical
Amaranthus palmeri S. Watson	-	Amaranthaceae	Therophyte	N. and C. America (Mexico)
Amaranthus retroflexus L.	-	Amaranthaceae	Therophyte	N. America
Amaranthus spinosus L.	سندار- ضوح	Amaranthaceae	Therophytes	T. America
Amaranthus tricolor L.	-	Amaranthaceae	Therophyte	S. Asia
Ambrosia artemisiifolia L.	-	Asteraceae	Therophyte	N. America
Argemone mexicana L.	-	Papaveraceae	Therophyte	S. America
Atriplex canescens (Pursh) Nutt.	قطف	Amaranthaceae	Phanerophyte	N. America
Atriplex holocarpa F. Muell.	قطف	Amaranthaceae	Therophyte	Australia
Atriplex lindleyi subsp. *Inflate* (F. Muell.) P. G. Wilson	قطف	Amaranthaceae	Therophyte	Australia
Atriplex nummularia Lindl.	قطف	Amaranthaceae	Phanerophyte	Australia
Atriplex semibaccata R. Br.	قطف	Amaranthaceae	Therophyte	Australia
Atriplex suberecta Verd.	قطف	Amaranthaceae	Therophyte	Australia, S. Africa
Bidens bipinnata L.	-	Asteraceae	Therophyte	N. & S. America, Europe and Asia
Bidens pilosa L.	-	Asteraceae	Therophyte	T. America
Blainvillea acmella (L.) Philipson	-	Asteraceae	Therophyte	T. S. America
Bromus catharticus Vahl	خافور	Poaceae	Therophyte	S. America
Bromus inermis Leyss.	-	Poaceae	Geophyte	Europe
*Canna indica** L.	كنا	Cannaceae	Phanerophyte	S. and C. America
Cenchrus biflorus Roxb.	السافية	Poaceae	Therophyte	T. Africa, Arabia, S. Asia (India)
Cenchrus echinatus L.	-	Poaceae	Therophyte	T. America
Ceratonia siliqua L.	-	Fabaceae	Therophyte	Mediterranean
Chenopodium botrys L.	فِس الكلب، مِنتِنَة	Amaranthaceae	Chamaephyte	S. America
Chenopodium giganteum D. Don	-	Amaranthaceae	Therophyte	S. Asia (India)

Scientific name	Vernacular name	Family	Life form	Native range
Chloris pycnothrix Trin.	-	Poaceae	Therophyte	S. Asia (India)
Commelina benghalensis L.	-	Commelinaceae	Hemicryptophyte	S. Asia
Conyza bonariensis (S.Moore) Cufod.	حشيشة الجبل	Asteraceae	Therophyte	Palaeotropical
Cuscuta campestris Yunck.	الحامول -السوية	Convolvulaceae	Therophyte	S. America
Cuscuta chinensis Lam.	-	Convolvulaceae	Phanerophyte	N. America
Cynodon transvaalensis Burtt Davy	نجيل برتغالي	Poaceae	Geophyte	S. Asia (China), Australia
Datura innoxia Mill.	داتورة	Solanaceae	Therophyte	S. Africa
Datura metel L.	داتورة	Solanaceae	Therophyte	S. America
Datura stramonium L.	سم الفار	Solanaceae	Therophyte	S. America
Dichondra micrantha Urb.	-	Convolvulaceae	Hemicryptophyte	N. America
Digitaria violascens Link	-	Poaceae	Therophyte	E. Asia
Dinebra retroflexa (Vahl) Panz.	أبو ركبه	Poaceae	Therophyte	Palaeotropical
Dysphania ambrosioides (L.) Mosyakin & Clemants	أبو عفن	Amaranthaceae	Chamaephyte	C. and S. America (Mexico)
Eclipta prostrata (L.) L.	سعده	Asteraceae	Therophyte	S. Asia and T. America
Eragrostis japonica (Thunb.) Trin.	-	Poaceae	Therophyte	Palaeotropical
Eragrostis sarmentosa (Thunb.) Trin.	-	Poaceae	Geophyte	S Asia & Australia
Eragrostis tremula Hochst. ex. Steud.	-	Poaceae	Therophyte	T. Africa, S. Asia
Erigeron canadensis L.	-	Asteraceae	Therophyte	T. Africa & S. Asia (India)
*Erigeron sumatrensis**Retz.	-	Asteraceae	Therophyte	N. & S. America
Euphorbia heterophylla L.	شربة-لبن الحمارة	Euphorbiaceae	Therophyte	S. America
Euphorbia hirta L.	لبين	Euphorbiaceae	Therophyte	C. America
Euphorbia hyssopifolia L.	-	Euphorbiaceae	Therophyte	S. of N. America and C. America
Euphorbia inaequilatera Sond. var. *inaequilatera*	الصاب -المهيأ	Euphorbiaceae	Therophyte	C. America
Euphorbia lasiocarpa Klotzsch	-	Euphorbiaceae	Therophyte	S. America (Columbia)
Euphorbia mauritanica L.	لبين	Euphorbiaceae	Hemicryptophyte	C. and S. America (Mexico to Peru, west Indies)
Euphorbia prostrata Aiton	لبينة	Euphorbiaceae	Therophyte	S. Africa
Euphorbia serpens Kunth	-	Euphorbiaceae	Therophyte	TS America
Fallopia convolvulus (L.) Á. Löve		Polygonaceae	Therophyte	N. America
Festuca arundinacea Schreb.	-	Poaceae	Hemicryptophyte	Europe
Ficus carica L.	التين	Moraceae	Phanerophyte	Middle East and W. Asia
Galinsoga parviflora Cav.	-	Asteraceae	Therophyte	S. America
*Gomphrena celosioides** C.F.P.Mart.	-	Amaranthaceae	Therophyte	S. America
Heliotropium amplexicaule L.	-	Boraginaceae	Chamaephyte	S. America (Brazil to Argentina, W Indies)
Holcus annuus Salzm. ex C.A. Mey.	-	Poaceae	Therophyte	S. America
Ipomoea hederacea Jacq.	-	Convolvulaceae	Therophyte	Mediterranean
Ipomoea pes- carpae (L.) R. Br. subsp. *brasiliensis*	لِبلابَة	Convolvulaceae	Hemicryptophyte	C. and S. America

Scientific name	Vernacular name	Family	Life form	Native range
Lantana camara L.	لانتانا	Verbenaceae	Phanerophyte	T. America
Laphangium luteoalbum (L.) Tzvelev	صابون العفريت	Asteraceae	Therophyte	Unknwon
Lathyrus sativus L.	سعيدة	Fabaceae	Therophyte	TS America
Lepidium didynum L.	رشاد البحر	Brassicaceae	Therophyte	S. America
Lepidium virginicum L.	-	Brassicaceae	Therophyte	Europe
Ludwigia erecta (L.) Hara	-	Onageraceae	Therophyte	N. America
Lycium europaeum L.	عوسج	Solanaceae	Phanerophyte	Europe
*Matricaria chamomilla** L.	بابونج	Asteraceae	Therophyte	S. Asia (China)
*Melia azedarach** L.	زنزلخت	Meliaceae	Phanerophyte	Europe
Mentha spicata L. subsp. *spicata*	-	Lamiaceae	Geophyte	SW Asia
Merremia dissecta (Jacq.) Hallier f.	-	Convolvulaceae	Hemicryptophyte	Europe
Moorochloa eruciformis (Sm.) Veldkamp	نسيلة	Poaceae	Therophyte	Australia
*Moringa oleifera** Lam.	مورينجا	Moringaceae	Phanerophyte	S. Asia
Nicandra physaloids (L.) Scopoli	هدالب	Solanaceae	Therophyte	W. of S. America
Nicotiana glauca R. C. Graham	طباق	Solanaceae	Phanerophyte	S. Africa
Nicotiana plumbaginifolia Viv.	-	Solanaceae	Phanerophyte	S. America (Argentina)
Nicotiana rustica L.	دخان أخضر-دخان بلدي	Solanaceae	Therophyte	S. America
Nothoscordum gracile (Aiton) Stearn	-	Amaryllidaceae	Geophyte	S. America
Oenothera drummondii Hook.	-	Onageraceae	Chamaephyte	S. America
Oxalis corniculata L.	حمد	Oxalidaceae	Geophyte – Helophyte	N. America
Oxalis pes-caprae L.	عرق اليمون	Oxalidaceae	Geophyte – Helophyte	Cape of S. Africa
Panicum antidotale Retz.	-	Poaceae	Hemicryptophyte	S. Asia
Panicum maximum Jacq.	حشيش الجنية	Poaceae	Hemicryptophyte	T. Africa
Panicum miliaceum L.	دخن	Poaceae	Hemicryptophyte	T. Africa
Paspalum dilatatum Poir.	-	Poaceae	Hemicryptophyte	S. Asia (India)
Phalaris arundinacea L. var. *picta* L.	-	Poaceae	Geophyte	S. America
Phalaris canariensis L.	شعير الفأر	Poaceae	Therophyte	Mediterranean
Phleum pratense L.	-	Poaceae	Hemicryptophyte	N. America
Phyllanthus rotundifolius Willd.	-	Euphorbiaceae	Therophyte	Palaeotropical
Physalis angulata L.	-	Solanaceae	Therophyte	N., C. and S. Americas
Physalis ixocarpa Brot. ex Hornem.	-	Solanaceae	Therophyte	C. America (Mexico)
Plantago exigua Murray	-	Plantaginaceae	Therophyte	C. America (Mexico)
Pogonatherum paniceum (Lam.) Hack.		Poaceae	Geophyte	S. Asia (India)
Polygonum aviculare L.		Polygonaceae	Therophyte	S. Asia & Australia
Populus euphratica Oliv.	الحور	Salicaceae	Phanerophyte	N. Africa to C. Asia
Pycreus polystachyos (Rottb.) P. Beauv.	سعد	Cyperaceae	Geophyte-Halophyte	N.& W. Europe, C. & N. America
Ricinus communis L.	خروع	Euphorbiaceae	Phanerophyte	S. Mediterranean, E. Africa, S. Asia (India)
Rubus sanctus Schreb.	ورد بري	Rosaceae	Phanerophyte	Asia and Europe
Salix tetrasperma Roxb.	صفصاف كبير	Salicaceae	Phanerophyte	S. and SE Asia

Scientific name	Vernacular name	Family	Life form	Native range
Securigera securidaca (L.) Degen & Dörfl.	-	Fabacea	Therophyte	SE Asia
Sesbania sesban (L.) Merr.	سيسبان	Fabaceae	Phanerophyte	TE Africa (Egypt, Chad, Kenya, Uganda)
Setaria megaphylla (Steud.) T. Durand &Schinz		Poaceae	Geophyte	T. Africa
Setaria pumila (Poir.) Roem. & Schult.	شعر الفار	Poaceae	Therophyhte	Europe
Setaria verticillata (L.) Beauv.	قمح الفار	Poaceae	Therophyte	Europe
Setaria viridis (L.) Beauv.	ذيل الفأر	Poaceae	Therophyte	Euro-Asia
Solanum elaeagnifolium Cav.	-	Solanaceae	Chamaephyte	Europe
*Solanum linnaeanum** Happer&Jaegr		Solanaceae	Phanerophyte	C. & S. America
Sorghum virgatum (Hack.) Stapf.	ذرة جراوة-حشيش الفرس	Poaceae	Therophyte	S. America
Stenotapharum secundatum (Walter) Kuntze	نجيل فرنساوى	Poaceae	Hemicryptophyte	T. Africa
Symphyotrichum squamatum (Spreng.) Nesom	-	Asteraceae	Chamaephyte	USA (southeastern), S America
Tagetes minuta L.	-	Asteraceae	Therophyte	C. & S. America
Trianthema portulacastrum Lam.		Aizoaceae	Therophyte	S. America
Trifolium alexandrinum L.	برسيم بلدي	Fabaceae	Therophyte	S. America
Verbesina encelioides (Cav.) Benth. ex A. Gray	تباع الشمس	Asteraceae	Therophyte	N. and C. America (Mexico)
Veronica persica Poir		Scrophulariaceae	Therophyte	Euro-Asia
Withania somnifera (L.) Dunal	مرجان-سم فراخ	Solanaceae	Chamaephyte	T. Africa
Xanthium spinosum L.	شبيط	Asteraceae	Therophyte	S. America
Xanthium strumarium L.	شبكة	Asteraceae	Therophyte	N. America
Ziziphus spina-christi (L.) Desf.	نبق	Rhamnaceae	Phanerophyte	E..Africa
Invasive				
*Acacia saligna** (Labill.) H. Wendl.		Fabaceae	Phanerophyte	W. Australia
Azolla filiculoides L.	آزولا	Azollaceae	Hydrophyte	S. Asia (China, Philippines), Netherlands
Bassia indica (Wight) A. J. Scott	كوخيا	Amaranthaceae	Therophyte	W. Mediterranean to E. Asia
*Dalbergia sissoo** Roxb.	سرسوع	Fabaceae	Phanerophyte	S. Asia (India)
Eichhornia crassipes (C. Mart.) Solms	ورد النيل	Pontederiaceae	Hydrophyte	S. America (Brazil)
Ipomoea carnea Jacq.	-	Convolvulaceae	Chamaephyte	TS America
*Prosopis juliflora** (Sw) DC.	غويف، غويفه	Fabaceae	Phanerophyte	C. America (Mexico)