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 paleotropics (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
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
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 & Boullos (1988); Hepper (1998), Xuxley E. (1999); Boullos (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. 1 Map of Egypt showing the visited areas (•).](image1)

![Fig. 2](image2)

**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).

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. (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

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 one 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 (%).
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-Grapel 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.         | كندة            | Fabaceae          | Phanerophyte      | T. & subtropical America         |
| Ageratum houstonianum Mill.            |                 | Asteraceae        | Therophyte        | C. America                        |
| Alcea rosea                            |                 | Malvaceae         | Hemicryptophyte   | E. Asia                           |
| Allium cepa L.                         |                 | Amaryllidaceae    | Geophyte          | W. Asia                           |
| Allium sativum L.                      |                 | Amaryllidaceae    | Geophyte          | C. Asia                           |
| Alternanthera pungens Kunth            |                 |                    |                   |                                   |
| Allthaea ludwigi L.                    |                 | 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.                        | زمرر             | Poaceae           | Therophyte        | Middle East                       |
| Bauhinia variegata* L.                 | خف الجمل          | Fabaceae          | Phanerophyte      | S. Asia (India & China)           |
| Beta vulgaris subsp. maritima (L.) Arcang. |             |                    |                   |                                   |
| Brassica oleracea var. oleracea        | كربص             | Brassicaceae      | Therophyte        | W. Europe                         |
| Brassica rapa L. var. rapa             | أفت             | 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.            |                 | Casuarinaceae     | Phanerophyte      | SE Asia to NE Australia and Pacific Islands |
| Casuarina stricta * L.                 |                 | Casuarinaceae     | Phanerophyte      | SE Australia                      |
| Cenchrus americanus (L.) Morrone       | نخيل الفازر     | 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.                | نشوك             | Asteraceae        | Chamaephyte       | Middle East, C. Europe            |
| Chloris virgata Sw.                    |                 | Poaceae           | Therophyte        | Palaeotropical                    |
| Chrysopogon zizanioides (L.) Roberty    | نخيل الهند      | Poaceae           | Geophyte          | S. Asia (India)                   |
| Citrullus lanatus* (Thunb.) Mastum & Naki |             |                    |                   |                                   |
| Clitoria ternatea L.                   | عرق العرب        | Fabaceae          | Phanerophyte      | S. Asia                           |
| Coix lacryma-jobi L.                   |                 | Poaceae           | Therophyte        | S. Asia                           |
| Coriandrum sativum L.                  |                 | Apioideae         | Therophyte        | S. Europe                         |
| Cortaderia selloana (Schult. &Schult.f.) Asch. & Graebn. |         | 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 عصلي        | Cucurbitaceae        | Therophyte      | Probably from N. America                         |
| Cyclospermum leptophyllum (Pers.) Sprague |                 | Anacardiaceae        | Therophyte      | Europe (Africa)                                  |
| Cymbopogon citratus (DC.) Stapf        |                 | Poaceae              | Geophyte        | S. Asia (S. India & Sri Lanka)                   |
| Cymbopogon flexuosus (Nees ex Steud.) Watson |                 | Poaceae              | Geophyte        | S. Asia (India)                                  |
| Cymbopogon jwarancusa (Jones) Schultz. |                 | Poaceae              | Geophyte        | S. Asia (India)                                  |
| Cymbopogon martini (Roxb.) J. F. Watson in Atkins. |                 | Poaceae              | Geophyte        | S. Asia (India)                                  |
| Cyperus involucratus Rottb.            |                 | Cyperaceae           | Geophyte        | T. Africa                                        |
| Dactylis glomerata L.                  |                 | Poaceae              | Geophyte        | N. Asia & Europe                                 |
| Desmodium tortuosum* (Sw.) DC.         |                 | Fabaceae             | Therophyte      | T. America                                       |
| Ehrharta calycula Sin.                 |                 | Poaceae              | Geophyte        | S. Africa                                        |
| Eleusine coracana (L.) Gaertn.         | ينجه            | 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.               |                 | Hydrocharaceae       | Hydrophyte      | N. America                                       |
| Erarogostis tef (Zucc.) Trott.         |                 | Poaceae              | Therophyte      | E. Africa (Ethiopia)                             |
| Eruca vesicaria* (L.) Cav.             |                 | Brassicaceae         | Therophyte      | Middle East-West Asia                            |
| Eucalyptus camaldulensis* Dehn.        |                 | Myrtaceae            | Phanerophyte    | Australia                                        |
| Euphorbia nutans Lag.                  |                 | Euphorbiaceae        | Therophyte      | N. America                                       |
| Ficus retusa L. *                      |                 | Moraceae             | Phanerophyte    | S. Asia (Philippines to N Borneo)                |
| Foeniculum vulgare Mill. subsp. vulgare|                 | Apiaceae             | Hemicryptophyte | Europe                                           |
| Gisekia pharamoeidex L.                |                 | Gisekiaceae          | Therophyte      | Palaeotropical                                   |
| Hedysarum coronarium L.                |                 | Fabaceae             | Therophyte      | Europe (Italy)                                   |
| Heliotrobus curassavicum Vahl           |                 | Fabaceae             | Therophyte      | Europe                                           |
| Hibiscus esculentus* L.                |                 | Malvaceae            | Phanerophyte    | S. Asia                                          |
| Hibiscus sabdariffa L.                 |                 | Malvaceae            | Therophyte      | S. Asia and (Africa)?                            |
| Hordeum vulgare L.                     |                 | Poaceae              | Therophyte      | S. Asia (India)                                  |
| Ipomoea cairica (L.) Sweet             |                 | Convolvulaceae       | Geophyte        | T. Africa and S. Asia                            |
| Khaya senegalensis* (Desv.) A Juss     |                 | Meliaceae            | Phanerophyte    | TW Africa                                        |
| Lablab purpureus* (L.) Sweet           |                 | Fabaceae             | Chamaephyte     | T. Africa                                        |
| Lepidium draba L.                      |                 | Brassicaceae         | Hemicryptophyte | S. Europe                                        |
| Lepidium sativum L.                    |                 | Brassicaceae         | Therophytes     | Eastern Mediterranean to S Asia (India)          |
| Linum usitatissimum L.                 |                 | Linaceae             | Therophyte      | Europe                                           |
| Luffa cylindrica* (L.) M. Roem.        |                 | Cucurbitaceae        | Phanerophyte    | S. Asia & T/ Africa                              |
| Lupinus albus Schreb.                  |                 | Fabaceae             | Therophyte      | S. Europe                                        |
| Lycopersicon esculentum* P. Mill.      |                 | Solanaceae           | Hemicryptophyte | T. America                                       |
| Mangifer a indica* L.                  |                 | Anacardiaceae        | Phanerophyte    | N. America                                       |
| Medicago sativa L.                     |                 | Fabaceae             | Therophyte      | W. Asia                                          |
## Scientific namers

| Scientific name | Vernacular name | Family | Life form | Native range |
|-----------------|-----------------|--------|-----------|--------------|
| Melinis minutiflora | - | Poaceae | Geophyte | T. Africa |
| Melinis repens (Willd.) Zizka subsp. grandiflora (Hochst.) Zizka | - | Poaceae | Therophyte | T. Africa |
| Mentha pulegium | نعناع | Lamiaceae | Chamaephyte | W. and C. Europe, Middle East, N. Africa |
| Mimosa pigra L. | - | Fabaceae | Panerohyte | S. America |
| Miscanthus sinensis | - | Poaceae | Geophyte | Europe & SE Asia (China, Japan, Korea) |
| Momordica balsamina | - | Cucurbitaceae | Therophyte | Palaeotropical |
| Morus alba* L. | توت أبيض | Moraceae | Panerophyte | S. Asia (China) |
| Morus nigra* L. | توت أسود | Moraceae | Panerophyte | SW Asia |
| Nigella sativa L. | حبة المركة | Ranunculaceae | Therophyte | W. & S. Asia (India) |
| Oryza sativa | - | Poaceae | Geophyte | Mediterranean |
| Psidium guajava* L. | جوارج | Myrtaceae | Phanerophyte | T. America |
| Paspalum racemosum | - | Poaceae | Therophyte | Europe, W. Asia |
| Phalaris aquatica L. | بقدوس | Poaceae | Geophyte | Europe, W. Asia |
| Pisum sativum L. | بذلية | Fabaceae | Therophyte | Europe |
| Psidium guajava* L. | - | Myrtaceae | Panerophyte | T. America |
| Raphanus sativus* L. | فجل | Brassicaceae | Therophyte | Europe |
| Rosa palustris (L.) Besser | - | Brassicaceae | Therophyte | Subcosmopolitan |
| Sucrevarum officinarum L. | توتيل | Poaceae | Geophyte | S. & SE Asia |
| Schinus terebinthifolius* Raddi. | فلظ عريض | Anacardiaceae | Panerophyte | S. America (Brazil to Argentina) |
| Sesbania sesban (Willd.) Link | - | Fabaceae | Therophyte | T. Africa |
| Setaria italica (L.) P. Beauv. | - | Fabaceae | Therophyte | Europe |
| Sida acuta Burm.f. | - | Poaceae | Therophyte | Europe |
| Solanum melongena* L. | بانجان | Solanaceae | Panerophyte | S. Asia and S. Africa |
| Sporobolus x drummondii (Nees ex Steud.) Millsp. & Chase | - | Poaceae | Therophyte | Cultivated in the old world tropic |
| 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. Africa |
| Trigonaena pentandra | - | Fabaceae | Therophyte | Mediterranean |
| Urochloa mutica (Forssk.) T.O.Nguyen | - | Poaceae | Hemicryptophyte | SE Asia |
| Vicia faba* L. | - | Fabaceae | Therophyte | N. Africa, SW Asia |
| Viola tricolor | - | Violaceae | Therophyte | Europe |

**Updating the checklist of the alien flora in Egypt**
| Scientific name                  | Vernacular name | Family               | Life form   | Native range                                      |
|----------------------------------|-----------------|----------------------|-------------|--------------------------------------------------|
| Vitis vinifera* L.               | عنب              | Vitaceae             | Phanerophyte| Mediterranean, SW Asia, C. Europe                |
| Zea mays L.                      | ذرة شامسي        | Poaceae              | Therophyte  | C. America                                       |
| Zea mexicana (Schard.) Reeves &Mangelsd. | ذرة رياحه      | Poaceae              | Therophyte  | C. America (Mexico)                              |
| **Naturalized**                  |                  |                      |             |                                                  |
| Abutilon theophrasti Medik.      | حنونه            | Malvaceae            | Therophyte  | Palaeotropical                                   |
| Acrachne racemosa (B. Hyne ex Roem. & Schult.) Ohwi | -                | Poaceae              | Therophyte  | T. Africa                                        |
| Alopecurus myosuroides Huds.      | -               | Poaceae              | Therophyte  | S. Europe                                       |
| Alternanthera bettzickiana* (Regel) Voss | -             | Amaranthaceae        | Therophyte  | C. and S. America (Mexico 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.            | سنداز - ضحى    | Amaranthaceae        | Therophytes | T. America                                       |
| Amaranthus tricolor L.            | -               | Amaranthaceae        | Therophyte  | S. Asia                                          |
| Ambrosia artemisistifolia L.      | -               | Asteraceae           | Therophyte  | N. America                                       |
| Argemone mexicana L.              | -               | Papaveraceae         | Therophyte  | S. America                                       |
| Atriplex canescens (Pursh) Nutt.  | -               | Amaranthaceae        | Phanerophyte| N. America                                       |
| Atriplex holocarpa F. Muell.      | -               | Amaranthaceae        | Therophyte  | Australia                                        |
| Atriplex lindleyi subsp. Inflata (F. Muell.) P. G. Wilson | -       | Amaranthaceae        | Therophyte  | Australia                                        |
| Atriplex nummularia Lindl.        | -               | Amaranthaceae        | Phanerophyte| Australia                                        |
| Atriplex semibaccata R. Br.       | -               | Amaranthaceae        | Therophyte  | Australia                                        |
| Atriplex suberecta Verd.          | -               | Amaranthaceae        | Therophyte  | Australia, S. Africa                             |
| Bidens bipinnata L.               | -               | Asteraceae           | Therophyte  | N. & S. America, Europe and Asia                 |
| Bidens pilosa L.                  | -               | Asteraceae           | Therophyte  | T. America                                       |
| Blainvillea acemella (L.) Philipson | -               | Asteraceae           | Therophyte  | T. S. America                                    |
| Bromus catharticus Vahl           | -               | Poaceae              | Therophyte  | S. America                                       |
| Bromus inermis Leyss.             | -               | Poaceae              | Geophyte    | Europe                                           |
| Canna indica* L.                  | -               | Cannaceae            | Phanerophyte| S. and C. America                                |
| Chenopodium botrys Roxb.          | -               | Poaceae              | Therophyte  | T. Africa, Arabia, S. Asia (India)               |
| Chenopodium chenopodioides L.     | -               | Poaceae              | Therophyte  | T. America                                       |
| Ceratonia siliqua L.              | -               | Fabaceae             | Therophyte  | Mediterranean                                    |
| Chenopodium botrys L.             | -               | Poaceae              | Chamaephyte | S. America                                       |
| Chenopodium giganteum D. Don      | -               | Poaceae              | 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 | Hemicyrptophyte | S. Asia                                    |
| Conyza bonariensis (S.Moore) Cufod. | نحاسي الجبل  | Asteraceae | Therophyte | Palaeotropical                   |
| Cuscuta campestris Yunck.           | -               | Convolvulaceae | Therophyte | S. America                        |
| Cuscuta chinensis Lam.              | نجیل برتعالی  | Convolvulaceae | Phanerophyte | N. America                                     |
| Cynodon transvaalensis Burtt Davy   | نجیل برتغالی  | Poaceae    | Geophyte   | S. Asia (China), Australia         |
| Commelina benghalensis L.           | -               | Poaceae    | Therophyte | S. Asia                          |
| Conyza bonariensis (S.Moore) Cufod. | نحاسي الجبل  | Asteraceae | Therophyte | Palaeotropical                   |
| Cuscuta campestris Yunck.           | -               | Convolvulaceae | Therophyte | S. America                        |
| Cuscuta chinensis Lam.              | نجیل برتعالی  | Convolvulaceae | Phanerophyte | N. America                                     |
| Cynodon transvaalensis Burtt Davy   | نجیل برتغالی  | Poaceae    | Geophyte   | S. Asia (China), Australia         |
| Datura innoxia Mill.               | داتورا         | Solanaceae | Therophyte | S. Africa                        |
| Datura metel L.                     | داتورا         | Solanaceae | Therophyte | S. America                        |
| Datura stramonium L.                | سم الفار  | Solanaceae | Therophyte | S. America                        |
| Dichondra micrantha Urb.           | -               | Convolvulaceae | Hemicyrptophyte | N. America                                     |
| Digitaria violascens Link           | -               | Poaceae    | Geophyte   | E. Asia                           |
| Dysphania ambrosioides (L.) Mosyakin & Clemants | - | Asteraceae | Therophyte | Palaeotropical                   |
| Eclipta prostrata (L.) L.           | سعدة          | Asteraceae | Therophyte | S. America 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.           | شریان تلحم  | Euphorbiaceae | Therophyte | S. America                        |
| Euphorbia hirta L.                  | سایین          | Euphorbiaceae | Therophyte | C. America                       |
| Euphorbia hyssoptolia L.            | -               | Euphorbiaceae | Therophyte | S. of N. America and C. America   |
| Euphorbia inaequilatera Sond. var. inaequilatera | - | Euphorbiaceae | Therophyte | C. America                       |
| Euphorbia lasiocarpa Klotzsch        | -               | Euphorbiaceae | Therophyte | S. America (Columbia)             |
| Euphorbia mauritanica L.            | -               | Euphorbiaceae | Hemicryptophyte | C. and S. America (Mexico to Peru, west Indies) |
| Euphorbia prostrata Aiton           | -               | Euphorbiaceae | Therophyte | S. Africa                        |
| Euphorbia serpens Kunth             | -               | Euphorbiaceae | Therophyte | TS America                       |
| Fallopia convolvulus (L.) A. Löve    | -               | Polygonaceae | Therophyte | N. America                       |
| Festuca arundinacea Schreb.         | -               | Poaceae    | Hemicyrptophyte | Europe                                      |
| Ficus carica L.                     | نتین          | 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 | - | Convolvulaceae | Hemicryptophyte | C. and S. America                     |
| Scientific name                  | Vernacular name       | Family             | Life form | Native range            |
|---------------------------------|-----------------------|--------------------|-----------|-------------------------|
| Lantana camara L.               | لانتنا                | Verbenaceae        | Phanerophyte | T. America              |
| Laphangium lutealbum (L.) Tzvelev | صابون النغريت     | Asteraceae         | Therophyte | Unkown                  |
| Lathyrus sativus L.              | سعدة                 | Fabaceae           | Therophyte | TS America              |
| Lepidium didymum L.              | رشاد البحر          | Brassicaceae       | Therophyte | S. America              |
| Lepidium virginicum L.           | -                    | Brassicaceae       | Therophyte | Europe                  |
| Ludwigia erecta (L.) Hara        | -                    | Onagraceae         | Therophyte | N. America              |
| Lycium europaeum L.              | - عربج               | Solanaceae         | Phanerophyte | Europe                  |
| Matricaria chamomilla* L.        | - بابونج             | Asteraceae         | Therophyte | S. Asia (China)         |
| Melia azedarach* L.              | - زنجلخت           | Meliaceae          | Phanerophyte | Europe                  |
| Mentha spicata L. subsp. spicata | -                    | Lamiaceae          | Geophyte   | SW Asia                 |
| Merremia dissecta (Jacq.) Hallier f. | -            | Convolvulaceae     | Hemicryptophyte | Europe                 |
| Moorochloa eruciformis (Sm.) Veldkamp | -            | Poaceae            | -          |                        |
| Moringa oleifera* Lam.           | موريجا              | Moringaceae        | Phanerophyte | S. Asia                 |
| Nicandra physaloids (L.) Scopoli | - هالبي             | Solanaceae         | Therophyte | W. of S. America        |
| Nicotiana glauca R. C. Graham    | - طليق              | Solanaceae         | Therophyte | S. Africa               |
| Nicotiana plumbaginifolia Viv.   | -                    | Solanaceae         | Phanerophyte | S. America (Argentina)  |
| Nicotiana rustica L.             | دخان أخضر دخان بليدي | Solanaceae         | Phanerophyte | S. America              |
| Nothoscordum gracile (Aiton) Steam | -                    | Amaryllidaceae     | Geophyte   | S. America              |
| Oenothera drummondii Hook.        | -                    | Onagraceae         | Chamaephyte | S. America              |
| Oxalis corniculata L.            | عرق الولد           | Oxalidaceae        | Geophyte – Helophyte | N. America |
| Oxalis pes-caprae L.             | -                    | Oxalidaceae        | Geophyte – Helophyte | Cape of S. Africa       |
| Panicum antitetrale Retz.         | -                    | Poaceae            | Hemicryptophyte | S. Asia                 |
| Panicum maximum Jacq.            | -                    | Poaceae            | Hemicryptophyte | T. Africa               |
| Panicum miliaceum L.             | دخن                  | Poaceae            | Hemicryptophyte | T. Africa               |
| Passpalum dilatatum Poir.         | -                    | Poaceae            | Hemicryptophyte | S. Asia (India)         |
| Phalaris arundinacea L. var. picta L. | -             | Poaceae            | Geophyte    | S. America              |
| Phalaris canariensis L.           | -                    | Poaceae            | Therophyte | Mediterranean           |
| Phleum pratense L.               | -                    | Poaceae            | Hemicryptophyte | N. America              |
| Phyllanthus rotundifolius Wild.   | -                    | Euphorbiaceae      | Therophyte | Palaeotropical          |
| Physalis angulata L.             | -                    | Solanaceae         | Therophyte | N., C. and S. Americas  |
| Physalis isocarpa Bro. ex Hornem. | -                    | Solanaceae         | Therophyte | C. America (Mexico)     |
| Planiago exigua Murray            | -                    | Plantaginaceae     | Therophyte | C. America (Mexico)     |
| Punctuation panicum (Lam.) Hack.  | -                    | Poaceae            | Geophyte    | S. Asia (India)         |
| Polygonum aviculare L.           | -                    | Polygonaceae       | Therophyte | S. Asia & Australia     |
| Populus euphratica Oliv.          | -                    | Salicaceae         | Phanerophyte | N. Africa to C. Asia    |
| Pycreus polystachyos (Rottb.) P. Beauv. | -             | Cyperaceae         | Geophyte-Halophyte | N. & W. Europe, C. & N. America |
| Ricinus communis L.              | - سعد                | Euphorbiaceae      | Phanerophyte | S. Mediterranean, E. Africa, S. Asia (India) |
| Rubus sanctus Schrebl.            | - ورد بری            | Rosaceae           | Phanerophyte | Asia and Europe         |
| Salix tetrasperma Roxb.           | - مصطفى 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.           | سيبان          | Fabaceae        | Phanerophyte   | TE Africa (Egypt, Chad, Kenya, Uganda) |
| Setaria megaphylla (Steed.) T. Durand & Schinz | -               | Poaceae         | Geophyte       | T. Africa                         |
| Setaria pumila (Poir.) Roem. & Schult. | شعر الفلاح     | Poaceae         | Therophyte     | Europe                            |
| Setaria verticillata (L.) Beauv.     | فصفي الفلاح    | Poaceae         | Therophyte     | Europe                            |
| Setaria viridis (L.) Beauv.          | نخيل الفلاح    | Poaceae         | Therophyte     | Euro-Asia                         |
| Solanum elaeagnifolium Cav.         | -               | Solanaceae      | Chamaephyte    | Europe                            |
| Solanum linnaeanaem* Happer & Jaegr | -               | Solanaceae      | Phanerophyte   | C. & S. America                    |
| Sorghum virgatum (Hack.) Stapf.     | نورة حدائق      | Poaceae         | Therophyte     | S. America                        |
| Stenotapharum secundatum (Walter) Kuntze | نجيل فرسانوى | 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.      | نسيم بلدي      | Aizoaceae       | Therophyte     | S. America                        |
| Trifolium alexandrinum L.           | نبات النعاس     | Fabaceae        | Therophyte     | S. America                        |
| Verbesina enceloides (Cav.) Benth. ex A. Gray | نبات الشمس | Asteraceae      | Therophyte     | N. and C. America (Mexico)        |
| Veronica persica Poir               | -               | Scrophulariaceae| Therophyte     | Euro-Asia                         |
| Withania somnifera (L.) Dunal       | مرجان-سم فراح | Solanaceae      | Chamaephyte    | T. Africa                          |
| Xanthium spinosum L.                | نبتة            | Asteraceae      | Therophyte     | S. America                        |
| Xanthium strumarium L.              | شوكة            | Asteraceae      | Therophyte     | N. America                        |
| Ziziphus spin christi (L.) Desf.    | نبيك            | Rhamnaceae      | Phanerophyte   | E., Africa                        |

**Invasive**

| Scientific name                      | Vernacular name | Family          | Life form      | Native range                      |
|--------------------------------------|-----------------|-----------------|----------------|-----------------------------------|
| Acacia saligna* (Labill.) H. Wendl. | -               | Fabaceae        | Phanerophyte   | W. Australia                      |
| Azolla filiculoides L.               | أزولا           | Azollaceae      | Hydrophyte     | S. Asia (China, Philippines), Netherlands |
| Bassia indica (Wight) A. J. Scott    | كوكبا           | Amaranthaceae   | Therophyte     | W. Mediterranean to E. Asia      |
| Dalbergia sisoo* Roxb.               | سرورة          | 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.         | غريف، غريفة    | Fabaceae        | Phanerophyte   | C. America (Mexico)               |