



Contribution to the Flora of Egypt: Taxonomic and Nomenclature changes

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Abstract:

Updated nomenclatural treatment of the native and naturalized vascular flora of Egypt is presented. It was compiled by referring to several information sources such as existing literature, relevant online database, and herbaria collections. Recent molecular phylogenetics have resulted in the identification of new families. All families, genera, and species have been updated in their circumscription and nomenclature based on the classification of the Angiosperm Phylogeny Group (APG III & APG IV). The updated nomenclature and current taxonomic status of 288 taxa (including 34 subspecies, and 22 varieties) belonging to 169 genera and 49 families are provided. The nomenclature changes of all taxa are on the basis of the most recent taxonomic treatments which combined genera previously included in other families, or even in new families. Only the specific and infraspecific taxa that are previously mentioned in the latest checklist and now treated as synonyms are reported. Twenty-two families are changed to up-to-date names and become synonyms of other families. Seven new family names are added to the Flora of Egypt namely: Salveniaceae, Gisekiaceae Hypericaceae, Lophiocarpaceae, Limeaceae, Phyllanthaceae, Linderniaceae, and Phrymaceae; in addition, *Nanorrhinum* is a new generic name of family Plantaginaceae.

Key words: Flora of Egypt, *Nanorrhinum*, New family names, Nomenclatural changes

Introduction:

The Egyptian flora has received only limited research coverage, notable is those of Ascherson & Schweinfurth (1887-1889), Sickenberger (1901), Muschler (1912), Ramis (1929), Täckholm, G., Täckholm, V. & Drar (1941) Täckholm & Drar (1950-1969) Täckholm (1956, 1974). However, the most up-to-date data go back to El Hadidi & Fayed (1994/95); Boulos (1999-2005). Currently, the most comprehensive checklist (database) for vascular plants in Egypt was edited by Boulos (2009), in which he recorded 2145 species and 220 infraspecific taxa belonging to 755 genera and 129 families of native and naturalized vascular plants. Four cultivated onions (*Allium*, Alliaceae) and 44 cultivated species of grasses (Poaceae) are the only cultivated taxa in his list. The increasing influence of the APG classification system necessitates an update on taxa recorded in most regional floras. Many changes in circumscriptions of families and orders have occurred in the APG systems in comparison with other

classification systems. As well as, many thousands of new names and nomenclatural corrections added to WFO (The World Flora online) as well as International Plant Name Index (IPNI). Accordingly, the need for an update nomenclature and correction of synonyms of the Egyptian flora is greatly apparent.

This work resulted from the project 'National Network of Egyptian Herbaria- NNEH' funded by The Academy of Science and Technology. This project aims to establish a comprehensive database of sufficient information and data on plant samples that are found in Egypt, based on materials kept in different Herbaria in Egypt in electronic form. The Herbarium of Cairo University (CAI) participated in this project. With the aid of database, it is possible to search not only for all records referring to the plants by their valid taxonomic name but also for their synonyms.

The aim of this contribution is to provide an updated list of taxonomic and nomenclatural changes of native and naturalized vascular flora of Egypt, to serve

as a taxonomical and nomenclatural basis for botanical and biosystematics studies.

Materials and Methods

1- Data collection:

To compile the present list, multiple information sources were examined and combined. Overall, a list of 288 taxa belonging to 169 genera and 49 families was obtained, all recorded taxa were organized by family rank. These families are listed alphabetically, as are the genera, species and subspecies within each family. We report only the specific and infraspecific taxa that are previously reported in Boulos (2009) and are now treated as synonyms (Table 1).

2- Taxonomic validation:

The obtained list was subjected to a taxonomic validation process. Taxonomic rank and plant names were verified and validated with international reference databases: Plants of the World Online (POWO, 2022), African Plant Database (APD, 2021), The Plant List (TPL, 2022); The World Flora Online

(WFO, 2022), World Checklist of Selected Plant Families (WCSP); International Plant Names Index (IPNI, 2022) and Tropicos (2022).

The taxonomic circumscription of the families follows the classification proposed by APG III (2009) and APG IV (2016) for Angiosperms (Table 2 & 3). Author citations of plant names were standardized in accordance with the rules of International Code of Botanical Nomenclature (Turland *et al.*, 2018).

Results and Discussion

Starting from the Flora of Egypt checklist, “Revised Annotated Edition” by Boulos (2009), the nomenclature of different ranks of taxa (family, genera, species and infraspecific taxa) was updated and critically checked according to more recent studies; in addition, numerous protologues and taxonomic databases were consulted.

The recorded list of the Egyptian vascular plants includes 288 taxa (with 34 subspecies, and 22 varieties) belonging to 169 genera and 49 families. These taxa are presented along with their updated nomenclature, and family names. (Table 1).

Table 1: List of taxa (after Boulos 2009) that have been updated to new accepted names. (Families are listed in alphabetical order in order to easily find the up-to-date names)

Family	Taxa (after Boulos 2009)	accepted up-to-date name
Acanthaceae	<i>Peristrophe paniculata</i> (Forssk.) Brummitt	<i>Dicliptera paniculata</i> (Forssk.) I.Darbysh.
Aizoaceae	<i>Mesembryanthemum forskahlii</i> Hochst. ex Boiss.	<i>Mesembryanthemum cryptanthum</i> Hook.f.
Alismataceae	<i>Caldesia reniformis</i> (D.Don) Makino	<i>Caldesia parnassifolia</i> (Bassi) Parl.
Amaranthaceae (incl. Chenopodiaceae)	<i>Amaranthus lividus</i> L. <i>Arthrocnemum macrostachyum</i> (Moric.) K. Koch <i>Atriplex leucoclada</i> Boiss. subsp. <i>turcomanica</i> (Moq.) Zohary <i>Chenopodium ambrosioides</i> L. <i>Salsola cyclophylla</i> Baker <i>Salsola imbricata</i> Forssk. subsp. <i>gaetula</i> (Maire) Boulos <i>Salsola imbricata</i> Forssk. subsp. <i>imbricata</i> <i>Salsola inermis</i> Forssk. <i>Salsola spinescens</i> Moq. <i>Salsola tetragona</i> Delile <i>Salsola tetrandra</i> Forssk.	<i>Amaranthus blitum</i> L. subsp. <i>oleraceus</i> (L.) Costea <i>Arthrocaulon macrostachyum</i> (Moric.) Piirainen & G. Kadereit <i>Atriplex turcomanica</i> (Moq.) Boiss. <i>Dysphania ambrosioides</i> (L.) Mosyakin & Clemants <i>Caroxylon cyclophyllum</i> (Baker) Akhani & Roalson <i>Caroxylon gaetulum</i> (Maire) Akhani & Roalson <i>Caroxylon imbricatum</i> (Forssk.) Moq. var. <i>imbricatum</i> <i>Caroxylon inerme</i> (Forssk.) Akhani & Roalson <i>Caroxylon spinescens</i> (Moq.) Akhani & Roalson <i>Caroxylon tetragonum</i> (Delile) Moq. <i>Caroxylon tetrandrum</i> (Forssk.) Akhani & Roalson

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	<i>Salsola villosa</i> Schult.	<i>Caroxylon villosum</i> (Schult.) Akhani & Roalson
	<i>Salsola vermiculata</i> L.	<i>Caroxylon vermiculatum</i> (L.) Akhani & Roalson
	<i>Salsola volkensis</i> Schweinf. & Asch.	<i>Caroxylon volkensis</i> (Schweinf. & Asch.) Akhani & Roalson
	<i>Sarcocornia fruticosa</i> (L.) A.J. Scott	<i>Salicornia fruticosa</i> (L.) L.
	<i>Sarcocornia perennis</i> (Mill.) A.J. Scott	<i>Salicornia perennis</i> Mill.
Amaryllidaceae (incl. Alliaceae)	<i>Allium kurrat</i> Schweinf. ex K. Krause	<i>Allium ampeloprasum</i> L.
	<i>Allium porrum</i> L.	<i>Allium ampeloprasum</i> L. subsp. <i>porrum</i> (L.) Hayek
	<i>Allium stamineum</i> Boiss. subsp. <i>decaisnei</i> (C. Presl) Kollmann	<i>Allium decaisnei</i> C. Presl
Anacardiaceae	<i>Rhus tripartita</i> (Ucria) Grande	<i>Searsia tripartita</i> (Ucria) Moffett
	<i>Rhus flexicaulis</i> Baker	<i>Searsia flexicaulis</i> (Baker) Moffett
Apiaceae (Umbelliferae)	<i>Ammi visnaga</i> (L.) Lam.	<i>Visnaga daucooides</i> Gaertn.
	<i>Apium crassipes</i> (W.D.J.Koch ex Rchb.) Rchb.f.	<i>Heliosciadium crassipes</i> W.D.J. Koch ex Rchb.
	<i>Apium leptophyllum</i> (Pers.) F. Muell.	<i>Cycospermum leptophyllum</i> (Pers.) Sprague ex Britton & P. Wilson
	<i>Apium nodiflorum</i> (L.) Lag.	<i>Heliosciadium nodiflorum</i> (L.) W.D.J. Koch
	<i>Astoma seselifolium</i> DC.	<i>Astomaea seselifolia</i> (DC.) Rauschert
	<i>Brachyapium dichotomum</i> (L.) Maire	<i>Stoibrax dichotomum</i> (L.) Raf.
	<i>Bupleurum falcatum</i> L. subsp. <i>exaltatum</i> var. <i>linearifolium</i> (DC.) H. Wolff	<i>Bupleurum exaltatum</i> M.Bieb.
	<i>Daucus littoralis</i> Sm.	<i>Daucus glaber</i> (Forssk.) Thell.
	<i>Foeniculum vulgare</i> subsp. <i>piperitum</i> (Ucria) Cout.	<i>Foeniculum piperitum</i> (Ucria) C.Presl
	<i>Malabaila suaveolens</i> Delile ex Coss.	<i>Leiotulus alexandrinus</i> Ehrenb.
	<i>Pseudorlaya pumila</i> (L.) Grande	<i>Daucus pumilus</i> (L.) Hoffmanns. & Link
Apocynaceae (incl. Asclepiadaceae)	<i>Caralluma acutangula</i> (Decne.) N.E.Br.	<i>Desmidorchis retrospiciens</i> Ehrenb.
	<i>Caralluma edulis</i> (Edgew.) Benth. ex Hook.f.	<i>Caudanthera edulis</i> (Edgew.) Meve & Liede
	<i>Caralluma europaea</i> (Guss.) N.E.Br.	<i>Apteranthes europaea</i> (Guss.) Murb.
	<i>Caralluma sinaica</i> (Decne.) A. Berger	<i>Caudanthera sinaica</i> (Decne.) Plowes
	<i>Glossonema boveanum</i> (Decne.) Decne. subsp. <i>boveanum</i>	<i>Cynanchum boveanum</i> Decne. subsp. <i>boveanum</i>
	<i>Glossonema boveanum</i> Decne. subsp. <i>nubicum</i> (Decne.) Bullock	<i>Cynanchum boveanum</i> Decne. subsp. <i>nubicum</i> (Decne.) Khanum & Liede
	<i>Pleurostelma schimperi</i> (Vatke) Liede	<i>Vincetoxicum schimperi</i> (Vatke) Meve & Liede
	<i>Solenostemma argel</i> (Delile) Hayne	<i>Solenostemma oleifolium</i> (Nectoux) Bullock & E.A. Bruce ex Maire
Asparagaceae (incl. Dracaenaceae)	<i>Asparagus stipularis</i> Forssk.	<i>Asparagus horridus</i> L.
	<i>Leopoldia bicolor</i> (Boiss.) Eig & Feinbrun	<i>Muscari bicolor</i> Boiss.
	<i>Leopoldia comosa</i> (L.) Parl.	<i>Muscari comosum</i> (L.) Mill.

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<p><i>Leopoldia eburnea</i> Eig & Feinbrun</p> <p><i>Leopoldia longipes</i> (Boiss.) Lonisk. subsp. <i>negevensis</i> Feinbrun & Danin</p> <p><i>Scilla hanburyi</i> Baker</p> <p><i>Urginea maritima</i> (L.) Baker</p> <p><i>Urginea undulata</i> (Desf.) Steinh.</p>	<p><i>Muscari eburneum</i> (Eig & Feinbrun) D.C. Stuart</p> <p><i>Muscari longipes</i> (Boiss.) Losinsk. subsp. <i>negevensis</i> (Feinbrun & Danin) Hosni</p> <p><i>Prospero hanburyi</i> (Baker) Speta</p> <p><i>Drimia maritima</i> (L.) Stearn</p> <p><i>Drimia purpurascens</i> J. Jacq.</p>
<p>Asteraceae (Compositae)</p>	<p><i>Achillea biebersteinii</i> Afanasiev</p>
<p><i>Achillea santolina</i> L.</p> <p><i>Anthemis cotula</i> Blanco</p> <p><i>Asteriscus hierochunticus</i> (Michon) Wiklund</p> <p><i>Asteriscus spinosus</i> (L.) Sch. Bip.</p> <p><i>Carduncellus eriocephalus</i> Boiss.</p> <p><i>Carduncellus mareoticus</i> (Delile) Hanelt</p> <p><i>Carduus pycnocephalus</i> L. subsp. <i>arabicus</i> (Jacq. ex Murray) Nyman</p> <p><i>Centaurea pumilio</i> L.</p> <p><i>Chamaemelum mixtum</i> (L.) All.</p> <p><i>Cnicus benedictus</i> L.</p> <p><i>Conyza aegyptiaca</i> (L.) Dryand.</p> <p><i>Conyza albida</i> Willd. ex Spreng.</p> <p><i>Conyza canadensis</i> (L.) Cronquist</p> <p><i>Conyza stricta</i> Willd.</p> <p><i>Cotula cinerea</i> Delile</p> <p><i>Doellia bovei</i> (DC.) Anderb.</p> <p><i>Echinops spinosus</i> L.</p> <p><i>Garhadiolus angulosus</i> Jaub. & Spach</p> <p><i>Helichrysum conglobatum</i> Steud.</p> <p><i>Homognaphalium crispatum</i> (Delile) Kirp.</p> <p><i>Homognaphalium pulvinatum</i> (Delile) Fayed & Zareh</p> <p><i>Ifloga labillardierei</i> (Pamp.) Fayed & Zareh subsp. <i>labillardierei</i></p> <p><i>Ifloga labillardierei</i> (Pamp.) Fayed & Zareh subsp. <i>hadidii</i> Fayed & Zareh</p> <p><i>Leontodon hispidulus</i> (Delile) Boiss.</p> <p><i>Leontodon laciniatus</i> (Bertol.) Widder ex Bornm.</p> <p><i>Leontodon simplex</i> (Viv.) Widder</p> <p><i>Matricaria recutita</i> L.</p> <p><i>Nauplius aquaticus</i> (L.) Cass.</p> <p><i>Nauplius graveolens</i> (Forssk.) Wiklund</p> <p><i>Otanthus maritimus</i> (L.) Hoffmanns. & Link</p>	<p><i>Achillea arabica</i> Kotschy</p> <p><i>Achillea tenuifolia</i> Lam.</p> <p><i>Eclipta prostrata</i> (L.) L.</p> <p><i>Pallenis hierochuntica</i> (Michon) Greuter</p> <p><i>Pallenis spinosa</i> (L.) Cass.</p> <p><i>Carthamus eriocephalus</i> (Boiss.) Greuter</p> <p><i>Carthamus mareoticus</i> Delile</p> <p><i>Carduus arabicus</i> Jacq. ex Murray subsp. <i>cinereus</i> (M. Bieb.) Kazmi</p> <p><i>Crocodilium pumilio</i> (L.) N. Garcia & Susanna</p> <p><i>Cladanthus mixtus</i> (L.) Chevall.</p> <p><i>Centaurea benedicta</i> (L.) L.</p> <p><i>Nidorella aegyptiaca</i> (L.) J.C. Manning & Goldblatt</p> <p><i>Erigeron sumatrensis</i> Retz.</p> <p><i>Erigeron canadensis</i> L.</p> <p><i>Eschenbachia stricta</i> (Willd.) Raizada</p> <p><i>Brocchia cinerea</i> (Delile) Vis.</p> <p><i>Blumea bovei</i> (DC.) Vatke</p> <p><i>Echinops spinosissimus</i> Freyn. subsp. <i>spinosissimus</i></p> <p><i>Garhadiolus hedypnois</i> Jaub. & Spach</p> <p><i>Helichrysum stoechas</i> (L.) Moench subsp. <i>barrelieri</i> (Ten.) Nyman</p> <p><i>Gnomophalium pulvinatum</i> (Delile) Greuter</p> <p><i>Gnomophalium pulvinatum</i> (Delile) Greuter</p> <p><i>Ifloga spicata</i> (Forssk.) Sch. Bip. subsp. <i>labillardierei</i> (Pamp.) Chrtek</p> <p><i>Ifloga spicata</i> (Forssk.) Sch. Bip. subsp. <i>hadidii</i> (Fayed & Zareh) Greuter</p> <p><i>Scorzoneroides hispidula</i> (Delile) Greuter & Talavera</p> <p><i>Scorzoneroides laciniata</i> (Bertol.) Greuter</p> <p><i>Scorzoneroides simplex</i> (Viv.) Greuter & Talavera</p> <p><i>Matricaria chamomilla</i> L.</p> <p><i>Asteriscus aquaticus</i> (L.) Less.</p> <p><i>Asteriscus graveolens</i> (Forssk.) Less.</p> <p><i>Achillea maritima</i> (L.) Ehrend. & Y.P. Guo</p>

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	<p><i>Picris altissima</i> Delile <i>Pulicaria inuloides</i> (Poir.) DC. <i>Scorzonera mollis</i> M. Bieb. var. <i>longifolia</i> Boiss. <i>Scorzonera undulata</i> Vahl</p> <p><i>Seriphidium herba-alba</i> (Asso) Soják <i>Sonchus bulbosus</i> (L.) N. Kilian & Greuter <i>Symphotrichum squamatum</i> (Spreng.) G.L. Nesom <i>Tragopogon sinuatus</i> Avé-Lall.</p> <p><i>Vernonia cinerascens</i> Sch.Bip.</p>	<p><i>Picris rhagadioloides</i> (L.) Desf. <i>Pulicaria arabica</i> (L.) Cass. <i>Pseudopodospermum molle</i> (M. Bieb.) Kuth.subsp. <i>molle</i> <i>Pseudopodospermum undulatum</i> (Vahl) Zaika, Sukhor. & N. Kilian <i>Artemisia herba-alba</i> Asso <i>Aetheorhiza bulbosa</i> (L.) Cass.</p> <p><i>Symphotrichum subulatum</i> var. <i>squamatum</i> (Spreng.) S.D. Sundb. <i>Tragopogon porrifolius</i> Pall. ex M. Bieb. subsp. <i>porrifolius</i> <i>Orbivestus cinerascens</i> (Sch.Bip.) H. Rob.</p>
Boraginaceae	<p><i>Alkanna lehmannii</i> (Tineo) A.DC.</p> <p><i>Anchusa hispida</i> Forssk. <i>Anchusa humilis</i> (Desf.) I.M. Johnst. <i>Anchusa undulate</i> L. subsp. <i>hybrida</i> (Tén.) Beg. <i>Echium sabulicolum</i> Pomel. var. <i>tenue</i> (Roth) Hadidy <i>Heliotropium bacciferum</i> Forssk. var. <i>erosum</i> (Lehm.) Hadidy <i>Heliotropium ovalifolium</i> Forssk.</p> <p><i>Heliotropium strigosum</i> Willd. var. <i>brevifolium</i> (Wall.) C.B. Clarke <i>Lappula sinaica</i> (A.DC.) Asch. & Schweinf. <i>Nonea ventricosa</i> (Sm.) Griseb. <i>Paracaryum bungei</i> (Boiss.) Brand <i>Paracaryum intermedium</i> (Fresen.) Lipsky</p>	<p><i>Alkanna tinctoria</i> Tausch subsp. <i>tinctoria</i> <i>Gastrocotyle hispida</i> (Forssk.) Bunge <i>Echium humile</i> Desf. <i>Anchusa hybrida</i> Ten.</p> <p><i>Echium tenue</i> Roth</p> <p><i>Heliotropium crispum</i> Desf.</p> <p><i>Euploca ovalifolia</i> (Forssk.) Diane & Hilger <i>Euploca strigosa</i> (Willd.) Diane & Hilger <i>Pseudolappula sinaica</i> (A.DC.) Khoshokhan, Sherafati & Kaz. Osaloo <i>Nonea echioides</i> (L.) Roem. & Schult. <i>Microparacaryum bungei</i> (Boiss.) Khat. <i>Microparacaryum intermedium</i> (Fresen.) Hilger & Podlech</p>
Brassicaceae (Cruciferae)	<p><i>Alyssum homalocarpum</i> (Fisch. & C.A. Mey.) Boiss.</p> <p><i>Alyssum marginatum</i> Steud. Ex Boiss.</p> <p><i>Arabidopsis kneuckeri</i> (Bornm.) O.E. Schulz</p> <p><i>Arabidopsis pumila</i> (Stephan ex Willd.) N. Busch</p> <p><i>Arabis nova</i> Vill. var. <i>sinaica</i> (Boiss.) Täckh. <i>Biscutella didyma</i> L. var. <i>depressa</i> (Willd.) El Naggar <i>Brassica tournefortii</i> Gouan</p> <p><i>Coronopus didymus</i> (L.) Sm. <i>Coronopus niloticus</i> (Delile) Spreng.</p>	<p><i>Cuprella homalocarpa</i> (Fisch. & C.A. Mey.) Salmerón-Sánchez, Mota & Fuertes</p> <p><i>Alyssum szovitsianum</i> Fisch. & C.A. Mey. <i>Crucihimalaya kneuckeri</i> (Bornm.) Al-Shehbaz, O'Kane & R.A. Price <i>Olimarabidopsis pumila</i> (Stephan ex Willd.) Al-Shehbaz, O'Kane & R.A. Price <i>Arabis recta</i> Vill.</p> <p><i>Biscutella didyma</i> L.var. <i>ciliata</i> (DC.) Vis. <i>Coincya tournefortii</i> (Gouan) Alcaraz, T.E.Díaz, Rivas Mart. & Sánchez- Gómez <i>Lepidium didymium</i> L. <i>Lepidium niloticum</i> (Delile) Sieber ex Steud.</p>

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	<i>Coronopus squamatus</i> (Forssk.) Asch.	<i>Lepidium coronopus</i> (L.) Al-Shehbaz
	<i>Diploaxis muralis</i> (L.) DC. subsp. <i>simplex</i> (Viv.) Jafri	<i>Diploaxis simplex</i> (Viv.) Spreng.
	<i>Eruca sativa</i> Mill.	<i>Eruca vesicaria</i> (L.) Cav.
	<i>Hymenolobus procumbens</i> (L.) Nutt.	<i>Hornungia procumbens</i> (L.) Hayek
	<i>Malcolmia africana</i> (L.) R.Br.	<i>Strigosella africana</i> (L.) Botsch.
	<i>Malcolmia crenulata</i> (DC.) Boiss.	<i>Zuvanda crenulata</i> (DC.) Askerova
	<i>Malcolmia nana</i> (DC.) Boiss.	<i>Maresia nana</i> (DC.) Batt.
	<i>Rorippa integrifolia</i> Boulos	<i>Nasturtiopsis integrifolia</i> (Boulos) Abdel Khalik & F.T. Bakker
	<i>Sinapis allionii</i> Jacq.	<i>Sinapis arvensis</i> L. subsp. <i>allionii</i> (Jacq.) Baillarg.
	<i>Sisymbrium runcinatum</i> Lag. ex DC.	<i>Dichasianthus runcinatus</i> (Lag. Ex DC.) V.I. Dorof.
Capparaceae	<i>Boscia senegalensis</i> Poir.	<i>Boscia integrifolia</i> J.St.-Hil.
Caprifoliaceae (incl. Dipsacaceae- Valerianaceae)	<i>Pterocephalus plumosus</i> (L.) Coult.	<i>Pterocephalus plumosus</i> (L.) F. Dietr.
	<i>Scabiosa aucheri</i> Boiss.	<i>Lomelosia aucheri</i> (Boiss.) Greuter & Burdet
	<i>Scabiosa olivieri</i> Coult.	<i>Lomelosia olivieri</i> (Coult.) Greuter & Burdet
	<i>Scabiosa palaestina</i> L.	<i>Lomelosia palaestina</i> (L.) Raf.
	<i>Scabiosa prolifera</i> L.	<i>Lomelosia prolifera</i> (L.) Greuter & Burdet
	<i>Valerianella discoidea</i> (L.) Loisel.	<i>Valeriana discoidea</i> (L.) Willd.
	<i>Valerianella szovitsiana</i> Fisch. & C.A. Mey.	<i>Valeriana szovitsiana</i> (Fisch. & C.A. Mey.) Christenh. & Byng
Caryophyllaceae	<i>Ankrypetalum gypsophiloides</i> Fenzl. var. <i>coelesyriacum</i> (Boiss.) Barkoudah & Hausskn.	<i>Gypsophila coelesyriaca</i> (Boiss. & Hausskn.) F.N. Williams
	<i>Arenaria serpyllifolia</i> L.	<i>Arenaria serpyllifolia</i> L. subsp. <i>leptoclados</i> (Rchb.) Nyman
	<i>Minuartia mediterranea</i> Ledeb.	<i>Sabulina mediterranea</i> (Ledeb. ex Link) Rchb.
	<i>Minuartia picta</i> (Sm.) Bornm. var. <i>picta</i>	<i>Eremogone picta</i> (Sm.) Dillenb. & Kadereit
	<i>Minuartia picta</i> (Sm.) Bornm. var. <i>sinaica</i> (Boiss.) Bornm.	<i>Eremogone sinaica</i> (Boiss.) Dillenb. & Kadereit
	<i>Sclerocephalus arabicus</i> Boiss.	<i>Gymnocarpos sclerocephalus</i> (Decne.) Dahlgren & Thulin
	<i>Spergula fallax</i> (Lowe) E.H.L. Krause	<i>Spergularia flaccida</i> (Madden) I.M. Turner
Celastraceae	<i>Maytenus senegalensis</i> (Lam.) Exell	<i>Gymnosporia senegalensis</i> (Lam.) Loes.
Cistaceae	<i>Helianthemum sphaerocalyx</i> Gauba & Janch.	<i>Helianthemum crassifolium</i> Pers. subsp. <i>sphaerocalyx</i> (Gauba & Janch.) Maire
	<i>Helianthemum vesicarium</i> Boiss. var. <i>ciliatum</i> (Desf.) Zohary	<i>Helianthemum virgatum</i> (Desf.) Pers. subsp. <i>ciliatum</i> (Desf.) Murb.
Cleomaceae	<i>Dipterygium glaucum</i> Decne.	<i>Cleome pallida</i> Kotschy
Colchicaceae	<i>Colchicum cornigerum</i> (Schweinf.) Täckh. & Drar	<i>Colchicum schimperi</i> Janka ex Stef.

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	<i>Colchicum palaestinum</i> (Baker) Boulos	<i>Colchicum palaestinum</i> (Baker) C. Archer
Commelinaceae	<i>Cyanotis barbata</i> D. Don	<i>Cyanotis vaga</i> (Lour.) Schult. & Schult.f.
Convolvulaceae	<i>Ipomoea sinensis</i> (Desr.) Choisy subsp. <i>blepharosepala</i> (Hochst. ex A. Rich.) A. Meeuse	<i>Ipomoea biflora</i> (L.) Pers.
	<i>Ipomoea stolonifera</i> J.F. Gmel.	<i>Ipomoea imperati</i> (Vahl) Griseb.
	<i>Merremia aegyptia</i> (L.) Urb.	<i>Distimake aegyptius</i> (L.) A.R. Simões & Staples
	<i>Merremia dissecta</i> (Jacq.) Hallier.f.	<i>Distimake dissectus</i> (Jacq.) A.R. Simões & Staples
	<i>Merremia semisagitta</i> (Griseb. ex Peter) Dandy	<i>Distimake semisagittus</i> (Griseb. ex Peter) A.R. Simões & Staples
Cymodoceaceae	<i>Cymodocea rotundata</i> Asch.	<i>Cymodocea rotundata</i> Asch. & Schweinf.
	<i>Cymodocea serrulata</i> (R.Br.) Asch. & Magnus	<i>Oceana serrulata</i> (R.Br.) Byng & Christenh.
Cyperaceae	<i>Cyperus alternifolius</i> Steud.	<i>Cyperus alterniflorus</i> R.Br.
	<i>Cyperus rotundus</i> L. var. <i>fenzelianus</i> (Steud.) Habashy	<i>Cyperus longus</i> L. subsp. <i>longus</i>
	<i>Fimbristylis sieberiana</i> Kunth	<i>Fimbristylis ferruginea</i> (L.) Vahl
	<i>Pycreus flavescens</i> (L.) P. Beauv. ex Rchb.	<i>Cyperus flavescens</i> L.
	<i>Pycreus flavidus</i> (Retz.) T. Koyama	<i>Cyperus flavidus</i> Retz.
	<i>Pycreus mundii</i> Nees	<i>Cyperus mundii</i> (Nees) Kunth
	<i>Pycreus polystachyos</i> (Rottb.) P. Beauv.	<i>Cyperus polystachyos</i> Rottb.
	<i>Schoenoplectus litoralis</i> (Schrad.) Palla subsp. <i>thermalis</i> (Trab.) S.S. Hoopé	<i>Schoenoplectus subulatus</i> (Vahl) Lye
	<i>Schoenoplectus mucronatus</i> (L.) Palla	<i>Schoenoplectiella mucronata</i> (L.) J. Jung & H.K. Choi
	<i>Schoenoplectus praelongatus</i> (Poir.) J. Raynal	<i>Schoenoplectiella praelongata</i> (Poir.) Lye
	<i>Schoenoplectus supinus</i> (L.) Palla	<i>Schoenoplectiella supina</i> (L.) Lye
Euphorbiaceae	<i>Euphorbia consobrina</i> N.E.Br.	<i>Euphorbia nubica</i> N.E.Br.
Fabaceae (Leguminosae)	<i>Acacia asak</i> (Forssk.) Willd.	<i>Senegalia asak</i> (Forssk.) Kyal. & Boatwr.
	<i>Acacia etbaica</i> Schweinf.	<i>Vachellia etbaica</i> (Schweinf.) Kyal. & Boatwr.
	<i>Acacia laeta</i> R.Br. ex Benth.	<i>Senegalia laeta</i> (R.Br. ex Benth.) Seigler & Ebinger
	<i>Acacia mellifera</i> (Vahl) Benth.	<i>Senegalia mellifera</i> (Benth.) Seigler & Ebinger
	<i>Acacia nilotica</i> (L.) Willd. ex Delile subsp. <i>nilotica</i>	<i>Vachellia nilotica</i> (L.) P.J.H. Hurter & Mabb.
	<i>Acacia nilotica</i> (L.) Delile subsp. <i>tomentosa</i> (Benth.) Brenan	<i>Vachellia nilotica</i> (L.) P.J.H. Hurter & Mabb. subsp. <i>tomentosa</i> (Benth.) Kyal. & Boatwr.
	<i>Acacia oerfota</i> (Forssk.) Schweinf. var. <i>oerfota</i>	<i>Vachellia oerfota</i> (Forssk.) Kyal. & Boatwr.
	<i>Acacia pachyceras</i> O. Schwartz. var. <i>najdensis</i> (Chaudhary) Boulos	<i>Vachellia gerrardii</i> (Benth.) P.J.H. Hurter var. <i>najdensis</i>

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	<i>Acacia seyal</i> Delile	(Chaudhary) Ragup., Seigler, Ebinger & Maslin
	<i>Acacia tortilis</i> (Forssk.) Hayne subsp. <i>raddiana</i> (Savi) Brenan	<i>Vachellia seyal</i> (Delile) P.J.H. Hurter <i>Vachellia tortilis</i> (Forssk.) Galasso & Banfi subsp. <i>raddiana</i> (Savi) Kyal. & Boatwr.
	<i>Acacia tortilis</i> (Forssk.) Hayne subsp. <i>tortilis</i>	<i>Vachellia tortilis</i> (Forssk.) Galasso & Banfi
	<i>Anthyllis tetraphylla</i> L.	<i>Tripodion tetraphyllum</i> (L.) Fourr.
	<i>Astragalus corrugatus</i> Bertol.	<i>Astragalus crenatus</i> Schult.
	<i>Astragalus hauarensis</i> Boiss.	<i>Astragalus arpilobus</i> Kar. & Kir. subsp. <i>hauarensis</i> (Boiss.) Podlech
	<i>Astragalus hispidulus</i> DC. subsp. <i>Kralikii</i> (Coss.ex Batt.) Täckh. & Boulos	<i>Astragalus kralikii</i> Coss. ex Batt.
	<i>Hedysarum spinosissimum</i> L.	<i>Sulla spinosissima</i> (L.) B.H. Choi & H. Ohashi
	<i>Hymenocarpus circinnatus</i> (L.) Savi	<i>Anthyllis circinnata</i> (L.) D.D. Sokoloff
	<i>Indigofera trita</i> L.f.var. <i>nubica</i> (J.B. Gillet) L. Boulos & Shrire	<i>Indigofera subulata</i> Vahl ex Boiss. var. <i>subulata</i>
	<i>Lotononis platycarpa</i> (Viv.) Pic.Serm.	<i>Leobordea platycarpa</i> (Viv.) B.-E.van Wyk & Boatwr.
	<i>Melilotus messanensis</i> (L.) All.	<i>Melilotus siculus</i> (Turra) Steud.
	<i>Pisum fulvum</i> Sm.	<i>Lathyrus fulvus</i> (Sm.) Kosterin
	<i>Securigera securidaca</i> (L.) Degen & Dörfl.	<i>Coronilla securidaca</i> L.
	<i>Tephrosia quartiniana</i> Cufod. ex Greuter & Burdet	<i>Tephrosia uniflora</i> Pers. subsp. <i>uniflora</i>
	<i>Trigonella hamosa</i> L.	<i>Trigonella glabra</i> Thunb. subsp. <i>glabra</i>
	<i>Vicia narbonensis</i> L. var. <i>serratifolia</i> (Jacq.) Ser.	<i>Vicia serratifolia</i> Jacq.
Gentianaceae	<i>Centaurium spicatum</i> (L.) Fritsch	<i>Schenkia spicata</i> (L.) G. Mans.
Geraniaceae	<i>Erodium laciniatum</i> (Cav.) Willd. subsp. <i>pulverulentum</i> (Cav.) Batt.	<i>Erodium pulverulentum</i> (Cav.) Willd.
Lamiaceae (Labiatae)	<i>Ballota damascena</i> Boiss.	<i>Pseudodictamnus damascenus</i> (Boiss.) Salmaki & Siadati
	<i>Ballota pseudodictamnus</i> (L.) Benth.	<i>Pseudodictamnus mediterraneus</i> Salmaki & Siadati
	<i>Ballota undulata</i> (Sieber ex Fresen.) Benth.	<i>Pseudodictamnus undulatus</i> (Benth.) Salmaki & Siadati
	<i>Clerodendrum acerbianum</i> (Vis.) Benth. & Hook.f.	<i>Volkameria acerbiana</i> Vis.
	<i>Eremostachys laciniata</i> (L.) Bunge	<i>Phlomoides laciniata</i> (L.) Kamelin & Makhm.
	<i>Lamium amplexicaule</i> L.	<i>Lamium amplexicaule</i> L. subsp. <i>amplexicaule</i>
	<i>Mentha longifolia</i> (L.) Huds.	<i>Mentha longifolia</i> (L.) L.
	<i>Thymus capitatus</i> (L.) Hoffmanns. & Link	<i>Thymbra capitata</i> (L.) Cav.
Malvaceae s.l. (incl. Tiliaceae; Sterculiaceae)	<i>Abutilon figarianum</i> Webb	<i>Abutilon pannosum</i> (G. Forst.) Schldl. var. <i>figarianum</i> (Webb) Verdc.
	<i>Althaea ludwigii</i> L.	<i>Malva ludwigii</i> (L.) Soldano, Banfi & Galasso
	<i>Lavatera cretica</i> L.	<i>Malva multiflora</i> (Cav.) Soldano, Banfi & Galasso

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	<i>Pavonia hirsuta</i> Guill. & Perr.	<i>Pavonia senegalensis</i> (Cav.) Leistner
Moraceae	<i>Ficus cordata</i> Thunb. subsp. <i>salicifolia</i> (Vahl) C.C. Berg	<i>Ficus salicifolia</i> Vahl
Nyctaginaceae	<i>Boerhavia coccinea</i> Mill. var. <i>viscosa</i> (Lag. & Rodr.) Moscoso <i>Boerhavia repens</i> L. var. <i>diandra</i> (L.) Maire & Weiller	<i>Boerhavia coccinea</i> Mill. <i>Boerhavia diandra</i> L.
Nymphaeaceae	<i>Nymphaea nouchali</i> Burm. f.	<i>Nymphaea nouchali</i> Burm.f. var. <i>caerulea</i> (Savigny) Verd.
Orobanchaceae	<i>Orobanche minor</i> Sm. var. <i>grisebachii</i> (Reut.) Hadidy <i>Orobanche minor</i> Sm. var. <i>pubescens</i> (d'Urv.) Meikle <i>Orobanche ramose</i> L. var. <i>schweinfurthii</i> (Beck) Hadidy	<i>Orobanche grisebachii</i> Reut. <i>Orobanche pubescens</i> d'Urv. <i>Orobanche schweinfurthii</i> Beck
Onagraceae	<i>Ludwigia stolonifera</i> (Guill. & Perr.) P.H. Raven	<i>Ludwigia adscendens</i> (L.) H. Hara subsp. <i>diffusa</i> (Forssk.) P.H. Raven
Papaveraceae	<i>Roemeria hybrida</i> (L.) DC. subsp. <i>dodecandra</i> (Forssk.) Maire	<i>Papaver dodecandrum</i> (Forssk.) Medik.
Plantaginaceae (incl. Globulariaceae)	<i>Anarrhinum pubescens</i> Fresen. <i>Bacopa monnieri</i> (L.) Penell <i>Kickxia acerbiana</i> (Boiss.) Täckh. & Boulos <i>Kickxia gracilis</i> D.A.Sutton <i>Kickxia hastata</i> (R.Br. ex Benth.) Dandy <i>Kickxia heterophylla</i> (Schousb.) Dandy <i>Kickxia macilentata</i> (Decne.) Danin <i>Kickxia scoparia</i> (Brouss. ex Spreng.) G. Kunkel & Sunding <i>Kickxia elatine</i> (L.) Dumort. subsp. <i>crinita</i> (Mabille) O. Bolòs & Vigo <i>Plantago arenaria</i> Waldst. & Kit. <i>Plantago commutata</i> Guss. <i>Plantago macrorhiza</i> Poir.	<i>Anarrhinum forskahlii</i> (J.F. Gmel.) Cufod. subsp. <i>pubescens</i> D.A. Sutton <i>Bacopa monnieri</i> (L.) Wettst. <i>Nanorrhinum acerbianum</i> (Boiss.) Betsche <i>Nanorrhinum heterophyllum</i> (Schousb.) Ghebr. <i>Nanorrhinum hastatum</i> (R.Br. ex Benth.) Ghebr. <i>Nanorrhinum heterophyllum</i> (Schousb.) Ghebr. <i>Nanorrhinum macilentum</i> (Decne.) Betsche <i>Nanorrhinum scoparium</i> (Brouss. ex Spreng.) Yousefi & Zarre <i>Kickxia elatine</i> (L.) Dumort. subsp. <i>sieberi</i> (Rchb.) Hayek <i>Plantago indica</i> L. <i>Plantago weldenii</i> Rchb. subsp. <i>weldenii</i> <i>Plantago coronopus</i> L. subsp. <i>macrorhiza</i> (Poir.) Arcang.
Plumbaginaceae	<i>Limonium meyeri</i> (Boiss.) Kuntze <i>Limonium sinuatum</i> (L.) Mill. subsp. <i>bonduellei</i> (Lestib.) Sauvage & Vindt <i>Limonium tubiflorum</i> (Delile) Kuntze var. <i>zanonii</i> (Pamp.) Maire	<i>Limonium scoparium</i> (Pall. ex Willd.) Stankov <i>Limonium bonduellei</i> (T. Lestib.) Kuntze <i>Limonium zanonii</i> (Pamp.) Domina
Poaceae (Gramineae)	<i>Ammophila arenaria</i> (L.) Link <i>Boissiera squarrosa</i> (Banks & Sol.) Nevski <i>Brachiaria deflexa</i> (Schumach.) C.E. Hubb. ex Robyns <i>Brachiaria eruciformis</i> (Sm.) Griseb. <i>Brachiaria leersioides</i> (Hochst.) Stapf	<i>Calamagrostis arenaria</i> (L.) Roth <i>Bromus pumilio</i> (Trin.) P.M.Sm. <i>Urochloa deflexa</i> (Schumach.) H. Scholz <i>Moorochloa eruciformis</i> (Sm.) Veldkamp <i>Urochloa leersioides</i> (Hochst.) A.M. Torres & C.M. Morton

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<i>Brachiaria ramosa</i> (L.) Stapf	<i>Urochloa ramosa</i> (L.) T.Q. Nguyen
<i>Brachiaria reptans</i> (L.) C.A. Gardner & C.E. Hubb.	<i>Urochloa reptans</i> (L.) Stapf
<i>Bromus diandrus</i> (Roth) subsp. <i>rigidus</i> (Roth) O. Bolòs, Masalles & Vigo	<i>Bromus rigidus</i> Roth
<i>Crypsis aculeata</i> (L.) Aiton	<i>Sporobolus aculeatus</i> (L.) P.M. Peterson
<i>Crypsis alopecuroides</i> (Piller & Mitterp.) Schrad.	<i>Sporobolus alopecuroides</i> (Piller & Mitterp.) P.M. Peterson
<i>Crypsis schoenoides</i> (L.) Lam.	<i>Sporobolus schoenoides</i> (L.) P.M. Peterson
<i>Crypsis vaginiflora</i> (Forssk.) Opiz	<i>Sporobolus niliacus</i> (Fig. & De Not.) P.M. Peterson
<i>Elymus elongatus</i> (Host) Runemark	<i>Thinopyrum elongatum</i> (Host) D.R. Dewey
<i>Elymus farctus</i> (Viv.) Runemark ex Melderis	<i>Thinopyrum junceum</i> (L.) Á. Löve
<i>Eragrostis amabilis</i> (L.) Wight & Arn.	<i>Eragrostis viscosa</i> (Retz.) Trin.
<i>Eremopoa altaica</i> (Trin.) Roshev.	<i>Poa diaphora</i> Trin. var. <i>diaphora</i>
<i>Eremopoa persica</i> (Trin.) Roshev	<i>Poa persica</i> Trin.
<i>Festuca arundinacea</i> Schreb.	<i>Lolium arundinaceum</i> (Schreb.) Darbysh.
<i>Leptochloa fusca</i> (L.) Kunth	<i>Diplachne fusca</i> (L.) P. Beauv. ex Roem. & Schult.
<i>Ochthochloa compressa</i> (Forssk.) Hilu	<i>Chloris flagellifera</i> (Nees) P.M. Peterson
<i>Oryzopsis holciformis</i> (M. Bieb.) Hack.	<i>Piptatherum holciforme</i> (M. Bieb.) Roem. & Schult.
<i>Oryzopsis miliacea</i> (L.) Asch. & Schweinf.	<i>Oloptum miliaceum</i> (L.) Röser & Hamasha
<i>Panicum maximum</i> Jacq.	<i>Megathyrsus maximus</i> (Jacq.) B.K. Simon & S.W.L. Jacobs
<i>Paspalidium geminatum</i> (Forssk.) Stapf	<i>Setaria geminata</i> (Forssk.) Veldkamp
<i>Pennisetum clandestinum</i> Hochst. ex Chiov.	<i>Cenchrus clandestinus</i> (Hochst. ex Chiov.) Morrone
<i>Pennisetum divisum</i> (J.F.Gmel.) Henrard	<i>Cenchrus divisus</i> (J.F.Gmel.) Verloove, Govaerts & Buttler
<i>Pennisetum glaucum</i> (L.) R.Br.	<i>Cenchrus americanus</i> (L.) Morrone
<i>Pennisetum orientale</i> Rich.	<i>Cenchrus orientalis</i> (Rich.) Morrone
<i>Pennisetum setaceum</i> (Forssk.) Chiov.	<i>Cenchrus setaceus</i> (Forssk.) Morrone
<i>Pennisetum sieberianum</i> (Schltdl.) Stapf & C.E. Hubb.	<i>Cenchrus sieberianus</i> (Schltdl.) Verloove
<i>Pennisetum villosum</i> Fresen.	<i>Cenchrus longisetus</i> M.C. Johnst.
<i>Pennisetum violaceum</i> (Lam.) Rich.	<i>Cenchrus violaceus</i> (Lam.) Morrone
<i>Phragmites australis</i> (Cav.) Trin. ex Steud. subsp. <i>altissimus</i> (Benth.) Clayton	<i>Phragmites australis</i> (Cav.) Trin. ex Steud. subsp. <i>isiacus</i> (Arcang.) ined.
<i>Stipa capensis</i> Thunb.	<i>Stipellula capensis</i> (Thunb.) Röser & Hamasha
<i>Stipa parviflora</i> Desf.	<i>Achnatherum parviflorum</i> (Desf.) M. Nobis
<i>Triticum dicoccum</i> Schrank ex Schübl.	<i>Triticum turgidum</i> L. subsp. <i>dicoccum</i> (Schrank ex Schübl.) Thell.
<i>Triticum durum</i> Desf.	<i>Triticum turgidum</i> L. subsp. <i>durum</i> (Desf.) Husn.
<i>Triticum pyramidale</i> Delile ex Schult.	<i>Triticum turgidum</i> L. subsp. <i>durum</i> (Desf.) Husn.

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	<i>Vulpia brevis</i> Boiss. & Kotschy	<i>Festuca brevis</i> (Boiss. & Kotschy) Asch., Schweinf. & Muschl.
	<i>Vulpia bromoides</i> (L.) Gray	<i>Festuca bromoides</i> L.
	<i>Vulpia fasciculata</i> (Forssk.) Fritsch	<i>Festuca fasciculata</i> Forssk.
	<i>Vulpia myuros</i> (L.) C.C. Gmel.	<i>Festuca myuros</i> L.
	<i>Vulpia pectinella</i> (Delile) Boiss.	<i>Festuca pectinella</i> Delile
Polygonaceae	<i>Calligonum polygonoides</i> L. subsp. <i>comosum</i> (L'Her.) Soskov.	<i>Calligonum comosum</i> L.'Her.
	<i>Emex spinosa</i> (L.) Campd.	<i>Rumex spinosus</i> L.
	<i>Persicaria salicifolia</i> (Brouss. ex Willd.) Assenov	<i>Persicaria decipiens</i> (R.Br.) K.L. Wilson
Pontederiaceae	<i>Eichhornia crassipes</i> (Mart.) Solms	<i>Pontederia crassipes</i> Mart.
Potamogetonaceae	<i>Potamogeton pectinatus</i> L.	<i>Stuckenia pectinata</i> (L.) Börner
Primulaceae	<i>Anagallis arvensis</i> L. var. <i>caerulea</i> (L.) Gouan	<i>Lysimachia arvensis</i> (L.) U. Manns & Anderb. var. <i>caerulea</i> (L.) Turland & Bergmeier
	<i>Anagallis arvensis</i> L. subsp. <i>foemina</i> (Mill.) Schinz & Thell.	<i>Lysimachia foemina</i> (Mill.) U. Manns & Anderb.
	<i>Anagallis pumila</i> Sw.	<i>Lysimachia ovalis</i> (Ruiz & Pav.) U. Manns & Anderb.
	<i>Asterolinon linum-stellatum</i> (L.) Duby	<i>Lysimachia linum-stellatum</i> L.
Ranunculaceae	<i>Ranunculus peltatus</i> Shrank subsp. <i>fucoides</i> (Freyn) Muñoz Garm.	<i>Ranunculus saniculifolius</i> Viv.
	<i>Ranunculus peltatus</i> Shrank subsp. <i>sphaerospermum</i> (Boiss. & C.I. Blanche) Meikle	<i>Ranunculus sphaerospermus</i> Boiss. & C.I. Blanche
Rhamnaceae	<i>Rhamnus lycioides</i> L. subsp. <i>oleoides</i> (L.) Jahand. & Maire	<i>Rhamnus oleoides</i> L.
Rosaceae	<i>Rubus sanctus</i> Schreb.	<i>Rubus creticus</i> Tourn. ex L.
	<i>Sanguisorba minor</i> Scop. subsp. <i>verrucosa</i> (Link ex G. Don) Holmboe	<i>Sanguisorba verrucosa</i> (Link ex G. Don) Ces.
Rubiaceae	<i>Pterogaillonia calycoptera</i> (Decne.) Linchevskii	<i>Plocama calycoptera</i> (Decne.) M. Backlund & Thulin
	<i>Valantia lanata</i> Delile ex Coss.	<i>Valantia columella</i> (Ehrenb. ex Boiss.) Bald.
Salviniaceae	<i>Azolla microphylla</i> Kaulf.	<i>Azolla filiculoides</i> Lam. subsp. <i>cristata</i> (Kaulf.) Fraser-Jenk.
Scrophulariaceae	<i>Anticharis linearis</i> Hochst. ex Asch.	<i>Anticharis senegalensis</i> (Walp.) Bhandari
Solanaceae	<i>Solanum sinaicum</i> Boiss.	<i>Solanum villosum</i> Mill.

After current nomenclatural treatment and molecular systematic studies (APG III & IV systems), several families are treated in a wide sense as Amaryllidaceae (incl. Agapanthaceae, Alliaceae); Asparagaceae (incl. Agavaceae, Hyacinthaceae, Ruscaceae); Malvaceae (incl. Bombacaceae, Sterculiaceae, Tiliaceae); Amaranthaceae (incl. Chenopodiaceae); Apocynaceae (incl. Asclepiadaceae); Convolvulaceae (incl.

Cuscutaceae); Solanaceae (incl. Nolanaceae). Moreover, many genera have been transferred to other families and also several families enlarged to accommodate genera transferred from other families. (Table 2, 3)

Recent Molecular studies resulted in a new classification of Scrophulariaceae, in which many genera have been transferred to other families

notably Plantaginaceae (*Bacopa* Aubl., *Limosella* L., *Veronica* L., *Anarrhinum* Desf., *Misopates* Raf., *Kickxia* Dumort., *Nanorrhinum* Betsche, and *Linaria* Mill.); or to Orobanchaceae (*Striga* Lour, *Parentucellia* Viv., *Lindenbergia* Lehm). Or even to new families: Phrymaceae (*Peplidium* Delile) and Linderniaceae (*Lindernia* All.) (Chase *et al.* 2009). On the other hand, the genus *Kickxia s.l.*, as a result of the phylogenetic study, have been split into *Kickxia s.s.* and *Nanorrhinum* Betsche. (Ghebrehiwet, 2001)

According to APG II (2003), Euphorbiaceae *s.l.* are divided into three families: Picrodendraceae, Phyllanthaceae include (*Andrachne* L., *Flueggea* Willd., *Phyllanthus* L.) whereas Euphorbiaceae *s.s.* include (*Euphorbia* L., *Ricinus* L., *Mercurialis* L. and *Chrozophora* Neck ex A. Juss.)

Zygophyllaceae includes genera formerly placed in Tribulaceae, and Balanitaceae. While Peganaceae and Tetradiclidaceae are included within Nitrariaceae (Shipunov 2021). The former family Asclepiadaceae is now treated as subfamily Asclepiadoideae among the five subfamilies of Apocynaceae. On the other hand, APG III (2009) defined Caprifoliaceae broadly so as to include Diervillaceae, Dipsacaceae, Linnaeaceae and Valerianaceae, as subfamilies: Diervilloideae, Dipsacoideae, Linnaeoidae, and Valerianoideae respectively.

Amaranthaceae *s.l.* is one of the largest families, now includes the genera of the former family Chenopodiaceae under subfamily Chenopodoideae. The genera of the family Cleomaceae and Capparaceae have long been considered closely related to and have often been included in the Brassicaceae; recent molecular studies support Capparaceae *s.s.* as a separate family. However, *Cleome* and several related genera are more closely related to members of the Brassicaceae than to Capparaceae. These genera are now either placed in the Brassicaceae or segregated into distinct family Cleomaceae (APG III, 2009 and Reveal, 2012).

Hypericaceae was accepted as a subfamily of the family Guttiferae (Clusiaceae) by many authors. Now it has been raised to family level with nine genera including the genus *Hypericum* Tourn. ex L. (Reveal, 2012; Stevens 2001–onward 2017; APG II 2003; APG III 2009).

Phylogenetic studies based on morphological and molecular data expanded family Malvaceae *s.l.* to include nine subfamilies: Malvoideae, Bombacoideae Burnett, Brownlowioideae Burnett, Byttnerioideae Burnett, Grewioideae Dippel, Helicteroideae Meisn., Dombeyoideae Burnett, Sterculioideae Beilschm., and Tilioideae Arn (Stevens 2001 onward 2017, Shipunov, 2021). On the other hand, Reveal (2012) treated these subfamilies as distinct families: Byttneriaceae, Sparmanniaceae, Tiliaceae *s.s.*, Sterculiaceae *s.s.*, Dombeyaceae, Berryaceae, Helicteraceae, Malvaceae *s.s.* and Bombacaceae respectively. (Shamsou and Khattab, 2016)

Recent molecular studies combined genera previously included in Dracaenaceae, and Hyacinthaceae within Asparagaceae *s.l.*, while Amaryllidaceae includes genera placed within the family Alliaceae (Reveal & Chase, 2011).

The genus *Limeum* L. has traditionally been recognized as belonging to the family Molluginaceae. However, the placement of the genus in the family Limeaceae is well supported by molecular data. On the other hand, the genus *Gisekia* that has at various times been placed in the Aizoaceae, Phytolaccaceae and Molluginaceae. However, the position of the genus in a separate family has been supported by recent studies. Lophiocarpaceae is a newly recognized family that includes the genera *Corbichonia* and *Lophiocarpus*, the two genera were previously included in Phytolaccaceae or Molluginaceae (Hernández-Ledesma, 2015). *Telephium*, a small genus of only five species is traditionally placed in the family Molluginaceae or Caryophyllaceae; according to APG III, the genus is treated as a member of Caryophyllaceae. (Tables 2,3)

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Table 2: List of new family names according to APG III and IV (2009 & 2016)

Family name according to Boulos 2009	Accepted family name
Actiniopteridaceae Pic.Therm.	Pteridaceae E.D.M. Kirchn.
Adiantaceae Juss.	Pteridaceae E.D.M. Kirchn.
Alliaceae Borkh.	Amaryllidaceae J.St.-Hill.
Asclepiadaceae Borkh.	Apocynaceae Juss.
Avicenniaceae Miq.	Acanthaceae Juss.
Azollaceae Wettst.	Salviniaceae Martinov
Balanitaceae Endl.	Zygophyllaceae R. Br.
Chenopodiaceae Vent.	Amaranthaceae A. Juss.
Crypogrammaceae	Pteridaceae E.D.M. Kirchn.
Dipsacaceae Juss.	Caprifoliaceae Juss.
Dracaenaceae Salisb.	Asparagaceae Juss.
Globulariaceae Lam. & DC.	Plantaginaceae Juss.
Hyacinthaceae Borkh. ex Borkh	Asparagaceae Juss.
Fumariaceae Marquis	Papaveraceae Juss.
Lemnaceae Gray	Araceae Juss.
Najadaceae Juss.	Hydrocharitaceae Juss.
Peganaceae (Engl.) Tiegh. ex Takht.	Nitrariaceae Lindl.
Tribulaceae Trautv.	Zygophyllaceae R. Br.
Sterculiaceae Vent	Malvaceae Juss.
Tiliaceae Juss.	Malvaceae Juss.
Valerianaceae Batsch	Caprifoliaceae Juss.
Zannichelliaceae Chevall.	Potamogetonaceae Bercht. & J. Presl

Table (3): Genera that have been moved to a new familial position

Genera	Families according to Boulos 2009	Accepted families name according to APG III,IV (2009-2016)
<i>Anarrhinum</i> Desf.	Scrophulariaceae Juss.	Plantaginaceae Juss.
<i>Andrachne</i> L.	Euphorbiaceae Juss.	Phyllanthaceae Martinov *
<i>Bacopa</i> Aubl.	Scrophulariaceae Juss.	Plantaginaceae Juss.
<i>Corbichonia</i> Scop.	Molluginaceae Bartl.	Lophiocarpaceae Doweld & Reveal *
<i>Flueggea</i> Willd.	Euphorbiaceae Juss.	Phyllanthaceae Martinov *
<i>Gisekia</i> L.	Molluginaceae Bartl.	Gisenkiaceae Nakai *
<i>Hypericum</i> Tourn. ex L.	Guttiferae Juss. (Clusiaceae Lindl.)	Hypericaceae Juss. *
<i>Kickxia</i> Dumort.	Scrophulariaceae Juss.	Plantaginaceae Juss.
<i>Limeum</i> L.	Molluginaceae Bartl.	Limeaceae Scipunov ex Reveal*
<i>Limosella</i> L.	Scrophulariaceae Juss.	Plantaginaceae Juss.
<i>Linaria</i> Mill.	Scrophulariaceae Juss.	Plantaginaceae Juss.
<i>Lindenbergia</i> Lehm	Scrophulariaceae Juss.	Orobanchaceae Vent.
<i>Lindernia</i> All.	Scrophulariaceae Juss.	Linderniaceae Borsch, Kai Müll. & Eb. Fisch. *
<i>Misopates</i> Raf.	Scrophulariaceae Juss.	Plantaginaceae Juss.
<i>Nanorrhinum</i> Betsche*	Scrophulariaceae Juss.	Plantaginaceae Juss.
<i>Parentucellia</i> Viv.	Scrophulariaceae Juss.	Orobanchaceae Vent.
<i>Peplidium</i> Delile	Scrophulariaceae Juss.	Phrymaceae Schauer *
<i>Phyllanthus</i> L.	Euphorbiaceae Juss.	Phyllanthaceae Martinov *
<i>Striga</i> Lour	Scrophulariaceae Juss.	Orobanchaceae Vent.
<i>Teledium</i> L.	Molluginaceae Bartl.	Caryophyllaceae Juss.
<i>Veronica</i> L.	Scrophulariaceae Juss.	Plantaginaceae Juss.

* New names to the flora of Egypt

Acknowledgements

This work was supported by The Academy of Scientific Research & Technology Egypt, (ASRT), to whom the authors are greatly indebted.

References

African Plant Database (version 3.4.0, 2021). Conservatoire et Jardin botaniques de la Ville de Genève and South African National Biodiversity Institute, Pretoria, "Retrieved [May, 2022]", from <<http://africanplantdatabase.ch>>

APG II. (2003). An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG II. *Botanical Journal of the Linnean Society* 141: 399–436.

APG III. (2009). The Angiosperm Phylogeny Group. An update of Angiosperm Phylogeny Group classification for the orders and families of flowering Plants. *Botanical Journal of the Linnean Society* 161 (2); 105-121.

APG IV. (2016). The Angiosperm Phylogeny Group. An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants. APG IV. *Botanical Journal of the Linnean Society* 181: 1–20

Ascherson, P.G. & Schweinfurth, G. (1887). Illustration de la Flore d’Egypte. *Mém. Inst. Egypt.* 2(1): 25-260

Ascherson, P.G. & Schweinfurth, G. (1889). Supplement a Illustration de la flore d’Egypte. *Mém. Inst. Egypt.* 2(1): 745-821

Boulos, L. (1999-2005). *Flora of Egypt*, vols.1-4. Al Hadara Publishing, Cairo, Egypt.

Boulos, L. (2009). *Flora of Egypt, Revised Annotated Edition*, Al Hadara Publishing, Cairo, Egypt.

Chase, M.W., Reveal, J.L. and Fay, M.F. (2009). A subfamilial classification for the expanded asparagalean families Amaryllidaceae, Asparagaceae and Xanthorrhoeaceae. *Botanical Journal of the Linnean Society* 161: 132–136.

Chase M.W., Reveal J.L. (2009). A phylogenetic classification of the land plants to accompany APG III. *Botanical Journal of the Linnean Society* 161: 122–127.

El Hadidi, M.N. and Fayed, A.A. (1994/95). Materials for Excursion Flora of Egypt. *Taeckholmia* 15: 1-283.

Fayed, A.A.; Soliman, M. Faried, A. and Hassan, M. (2019). Taxonomic evaluation of Euphorbiaceae *sensu lato* with special reference to Phyllanthaceae as a new family to the flora of Egypt. *Biological Forum – An International Journal*, 11(1): 47-64

Hernández-Ledesma, P; Berendsohn, W.G. Borsch, Th.; Mering, S., Akhani, H., et al. (2015). A taxonomic backbone for the global synthesis of

species diversity in the angiosperm order Caryophyllales. *Willdenowia* 45: 281-383

IPNI (2022). The International Plant Names Index Collaborators. International Plant Names Index. Checklist dataset <https://doi.org/>

Muschler, R. (1912). *Manual Flora of Egypt*. vols. 1,2. Berlin

Plants of the World Online (2022). Facilitated by the Royal Botanic Gardens, Kew. Published on the Internet; <http://www.plantsoftheworldonline.org/>

Ramis, R. (1929). *Bestimmungstabellen zur flora von Aegypten*. Jena

Reveal, J.L. and Chase, M.W. (2011). APG III: Bibliographical Information and Synonymy of Magnoliidae. *Phytotaxa* 19: 71–134

Reveal, J.L., (2012). An Outline of a Classification Scheme for Extant Flowering Plants. *Phytoneuron* 37: 1–221.

Sickenberger, E. (1901). Contribution a la Flore d’Egypte. *Mém. Inst. Egypt.* 4: 167-335

Shamsou, E.M and Khattab, A.A. (2016). Phenetic relationship between Malvaceae s.s. and its related families. *Taeckholmia* 36 :115-135

Shipunov, A.B. (2021). Systema Angiospermarum. v. 5.32 (May 20, 2021) <http://ashipunov.info/shipunov/ang/current/syang.pdf>

Stevens, P. F. (2001 onwards). Angiosperm Phylogeny Website. Version 14, July 2017 [and more or less continuously updated since]." (Variously accessed 2012–2021]. <http://www.mobot.org/MOBOT/research/APweb/>.

Täckholm, G; Täckholm, V. and Drar, M. (1941). *Flora of Egypt*, vol. I. Bull. Fac. Sci. no. 17: 1-574

Täckholm, V. and Drar, M. (1950). *Flora of Egypt*, vol. II. Bull. Fac. Sci. no. 28: 1-547

Täckholm, V. and Drar, M. (1954). *Flora of Egypt*, vol. III. Bull. Fac. Sci. no. 30: 1-644

Täckholm, V. and Drar, M. (1969). *Flora of Egypt* vol. IV. Bull. Fac. Sci. no. 36: 1-427.

Täckholm, V. (1956). *Students’ Flora of Egypt*. Anglo-Egyptian Bookshop, Cairo

Täckholm, V. (1974). *Students’ Flora of Egypt*, 2nd. ed. Cairo University.

The Plant List. (2022). Version 1.1. Published on the Internet; <http://www.theplantlist.org/>

The World Flora Online (2022). <http://www.worldfloraonline.org/>

Tropicos.org. (2022). Missouri Botanical Garden. <http://tropicos.org>

Turland, N. J., Wiersema, J. H., Barrie, F. R., Greuter, W., Hawksworth, D. L., Herendeen, P. S., Knapp, S., Kusber, W.-H., Li, D.-Z., Marhold, K., May, T. W., McNeill, J., Monro, A. M., Prado, J., Price, M. J. & Smith, G. F. (eds.) (2018): International Code of Nomenclature for algae, fungi, and plants (Shenzhen Code) adopted by the Nineteenth International Botanical Congress Shenzhen, China, July 2017. *Regnum Vegetabile* 159. Glashütten:

Contribution to the Flora of Egypt

Koeltz Botanical Books. DOI
<https://doi.org/10.12705/Code.2018>
World Checklist of Selected Plant Families. (2022).
Facilitated by the Royal Botanic Gardens, Kew
Published on the Internet;
<http://wcsp.science.kew.org/> Retrieved 22 March
2022.