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TAXONOMIC REVISION AND NUMERICAL ANALYSIS OF *HIBISCUS* L. IN EGYPT

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ABSTRACT

The present study undertakes a survey, taxonomical revision and numerical analysis of the genus *Hibiscus* L. in Egypt including wild and cultivated species. The taxonomic treatment based on collecting of fresh material from the studied species, in addition to the investigation of the herbarium specimens as well as information from the literature. Eleven species of *Hibiscus* were recorded, of which five wild species (*H. diversifolius* Jacq., *H. micranthus* L. f., *H. vitifolius* L., *H. sabdariffa* L. and *H. trionum* L.) and six cultivated species (*H. cannabinus* L., *H. mutabilis* L., *H. rosa-sinensis* L., *H. schizopetalus* (Dyer) Hook. f., *H. syriacus* L. and *H. tiliaceus* L.). An identification key to the species of *Hibiscus* is constructed. For each species, valid name, synonyms, morphological descriptions based on the examination of herbarium specimens and fresh materials as well as distribution, type specimen, habitat, selected specimens and economic importance are provided. The numerical analysis based on thirty six morphological characters including vegetative, flowers and fruits parts of the studied species. SPSS Statistics version 22 used to get morphometric analysis. The numerical analysis revealed two main clusters. The first cluster included 3 species, viz. *H. micranthus* L. f., *H. vitifolius* L. and *H. trionum* L. The second cluster included two groups: group (a) viz. *H. diversifolius* Jacq., H. *syriacus* L., and *H. tiliaceus* L., and group (b) viz. *Hibiscus cannabinus* L., *H. mutabilis* L., *H. rosa-sinensis* L., *H. sabdariffa* L. and *H. schizopetalus* (Dyer) Hook. f.

Keywords: Egypt; Flora; *Hibiscus*; Malvaceae; Taxonomy.

1. INTRODUCTION

The Genus *Hibiscus* L. belongs to the family Malvaceae Juss. which considered as one of the important families consists of about 111 genera and about 1800 species of herbs, shrubs and/or trees, distributed all over the world especially in warm temperate and tropical regions **(Mabberley, 1997)**. ***Hibiscus*** L. is a polymorphic and a large genus in Malvaceae. It contains about 300 species of annual or perennial herbs, shrubs or trees distributed in tropical and subtropical regions **(Mabberley, 1997)**. It occurs in various habitats, from grasslands to savannas, forests, and marshes (**Wilson, 1999**). The name ***Hibiscus*** L. was validated by **Linnaeus** in "***Species Plantarum***" **(1753)**. ***Hibiscus*** is derived from the Greek name *ibiskos*, said to be derived from the sacred Ibis, to which bird one species of the genus was consecrated in ancient Egypt. The genus was monographed by **Hochreutiner (1900)**, who recognized 197 species, and divided the genus into 12 sections. Since 1900, there had no revision for all the genus, except some taxonomic studies which treated with a certain sections as *Bombicella* (**Fryxell, 1980**) and *Furcaria* (**Wilson, 1994**, **1999**). Since that time few genera separated from *Hibiscus* as *Abelmoschus, Alyogyne, Radyera*, and *Wercklea* (**Fryxell, 1997**). In addition some species accepted as new *Hibiscus* species or some genera were emerged in it. *Hibiscus* species have been widely used in several formulae in traditional medicine (**Ling et al 2009**), and also the species are widely

cultivated as ornamental plants for their showy flowers (*H. rosa-sinensis* L. and *H. schizopetalus* (Dyer) Hook. f.), or cultivated for its fibers (*H. cannabinus* L. "kenaf") or for its fleshy calyx (*H. sabdariffa* L. "rosella").

In general, *Hibiscus* has been the subject of many taxonomical investigations focusing on the general morphological descriptions (**Masters, 1868; Andrews, 1952; Hutchinson and Dalziel, 1958; Hutchinson, 1967; Täckholm, 1974; Abedin, 1979; Townsend, 1980; Zohary, 1987; Boulos, 2000),** in addition to its anatomical, micromorphological or palynological studies (**Hosni and Araffa, 1999; El-Naggar, 2004; El-Naggar and Sawady, 2008).** The investigation, survey and documentation of the flora of Egypt have been studied extensively in several earlier works which included the wild species of *Hibiscus* (**Forskål, 1775**; **Delile, 1813; Boissier, 1867**; **Ascherson and Schweinfurth, 1887**; **Muschler, 1912; Montasir and Hassib, 1956**; **Täckholm, 1956, 1974**; **El-Hadidi et al 1999; Boulos, 2000**; **Shamso and Khattab, 2016)**. **Muschler (1912)** recorded three species of *Hibiscus* in Egypt viz. *H. trionum* L., *H. sabdariffa* L. and *H. cannabinus* L. while **Täckholm (1974)**, **El-Hadidi and Fayed (1994/95)**, **El-Hadidi et al (1999)** and **Boulos (2000, 2009)** recorded four species of *Hibiscus* in the flora of Egypt viz. *H. trionum* L., *H. sabdariffa* L., *H. micranthus* L.f. and *H. vitifolius* L. **Montasir and Hassib (1956)** said that *H. cannabinus* L. is cultivated species in Nile region and escaped from cultivation. **Badry et al (2015)** recorded *H. diversifolius* Jacq as a new addition to the flora of Egypt.

Numerical taxonomic studies are important for documenting and discovering the significance of morphological characters in determining the relationships in different groups of plants. Many studies have been made for understanding taxonomic relationships in different groups of plants (**Kahraman 2010; Abdel Khalik 2012; Heenan 2017; Fayed et al 2019**).

Certainly, no previous studies were reported concerning the cultivated species of *Hibiscus* in Egypt. This work aims to survey available species of *Hibiscus* (wild and cultivated) in Egypt, in respect to their taxonomic treatment, distribution in their phytogeographical regions and their uses for local communities, and the relationships among the species in numerical analysis.

2. MATERIALS AND METHODS

2.1. Taxonomic treatments

The present study based upon the morphological investigation of about 110 herbarium specimens in the major herbaria in Egypt (CAIM: Herbarium of Flora & Phytotaxonomy researches department, CAI: Cairo University Herbarium). In addition to fresh specimens collected during the field trips. About 35 herbarium specimens were prepared and deposited in CAIM. The dimensions and characters of leaves, flowers parts (including pedicel, epicalyx, calyx, corolla and staminal column), fruits and seeds were measured. The identification of the collected specimens was performed by using the appropriate floras of Egypt and adjacent floras **(Masters, 1868; Bailey, 1947, 1949**; **Andrews, 1956**; **Cullen, 1967; Webb, 1968**; **Täckhlom, 1974**; **Abedin, 1979; Townsend, 1980; Zohary, 1987**; **Boulos, 2000**) and other books about cultivated plants. In addition they compared with previously determined herbarium sheets and scientific illustrations. Nomenclature of studied species and their synonyms was updated according to the online sources (www.Tropicos.org; www.theplantlist.org). Identification key was constructed to differentiate between the studied species. Accepted scientific names with their citations, synonyms, descriptions, distributions, type specimens and habitats are provided for all species.

From the herbarium specimens examined, 1 to 3 selected specimens are chosen to represent each species. Economic importance includes uses in Egypt and other countries. The phytogeographical regions for the wild species in Egypt, according to **Boulos (2009) (Fig. 1).**

2.2. Numerical analysis

For the numerical analysis, thirty six morphological characters were used (**Table 1**). The characters were converted into binary states and multi-states (interval) code. Morphometric analysis of quantitative data related to the characters were done using SPSS Statistics version 22. The data matrix was subjected to cluster analysis using UPGMA (Unweighted pair group method with arithmetic mean) and a dendrogram was constructed to show the relationship among the species.

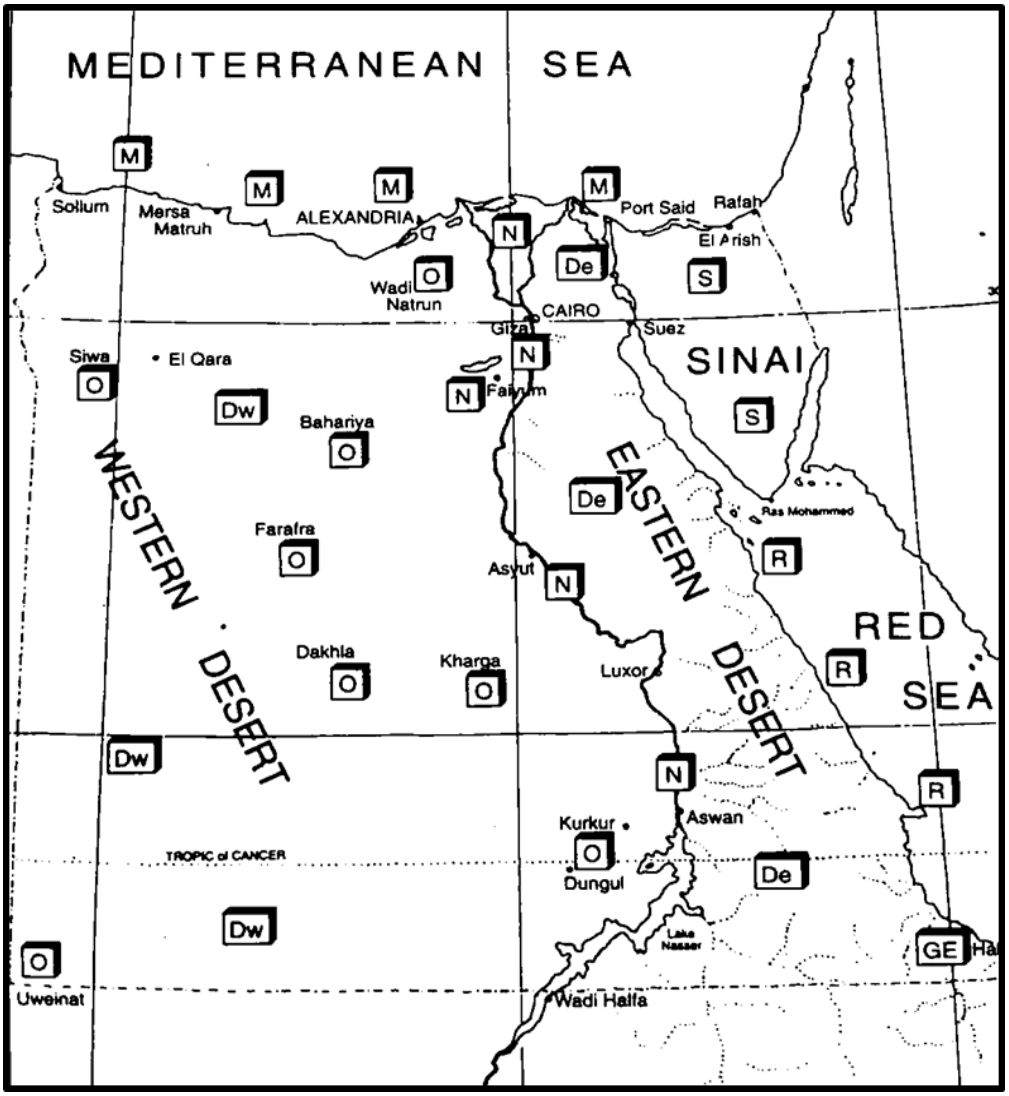

Fig. 1. Map indicates the phytogeographical regions in Egypt according to **Bolous (2009). Abbreviations: N=** the Nile region; **O**= the oases region; **M**= Mediterranean region; **R**= Red sea region; **GE**= Gebel Elba region; **De**= Eastern desert; **Dw**= western desert; **S**= Sinai region**.**

Table 1. Morphological characters used in the numerical analysis of *Hibiscus* species in Egypt

No.	Characters	Characters differentiation/code
		Habit
1	Habit growth	Tree (1) shrub (2) herb (3)
		Stem
2	Stem armed	unarmed (1) armed (2)
3	Stem texture	Almost glabrous (1) stellate hairy (2) pubescent or tomentose (3) villose (4) crisped and strigose hairs (5)
		Stipules
4	Stipules shape	Filiform (1) linear (2) linear-lanceolate (3) subulate (4) oblong ovate (5)
5	Stipules length	2-10 mm long (1) 11-30 mm long (2)
		Petiole
6	Petiole texture	Glabrous (1) pubescent (2) crisped hairs and strigose (3) strigose (4) villose (5)
		Leaves
7	Leaves outline	elliptic (1) ovate (2) ovate-cordate (3)
8	Adaxial surface texture	Glabrous (1) pubescent (2) hairy (3) strigose (4) strigose and pubescent (5)
9	Abaxial surface texture	Glabrous (1) pubescent (2) hairy (3) strigose (4) strigose and pubescent (5)
10	Upper leaves division	Entire (1) lobed (2) digitate (3)
11	Lower leaves division	Entire (1) lobed (2) digitate (3)
12	Leaves margin	Entire (1) dentate to serrate (2)
13	Leaves base	Cordate (1) cordate-truncate (2) cuneate (3) rounded (4)
14	Leaves apex	Acute (1) acuminate (2)
15	Leaves length	Less than or equal 3 cm (1) more than 3 cm (2)
		Pedicel
16	Pedicel texture	Glabrous (1) villose (2) pubescent or tomentose (3) strigose (4)
		Epicalyx
17	Epicalyx segments	Filiform (1) linear (2) linear-lanceolate (3) subulate (4) triangular (5)
18	Epicalyx texture	Stellate hairy (1) hispid (2) strigose (3) setose (4) pubescent (5) glabrous (6)
19	Epicalyx length	Less than 5 mm (1) more than or equal 5 mm (2)
		Calyx
20	Calyx lobes	Lanceolate (1) triangular (2) triangular-lanceolate (3) ovate (4) elliptic (5)
21	Calyx texture	Glabrous (1) pubescent or tomentose (2) strigose (3) setose (4)
22	Calyx apex	Acute (1) acuminate (2) long acuminate (3)
23	Calyx length	Less than 0.5 cm long (1) equal or more than 0.5 cm long (2)
		Corolla
24	Corolla diameter	Less than 3 cm across (1) more than 3 cm across(2)
		Petal
25	Petal shape	Obovate (1) rounded-obovate (2)
26	Petal apex	Entire (1) laciniate (2)
27	Petal length	Less than 1 cm (1) from 1.5 to 2.5 cm (2) more than 3 cm (3)
		Staminal column
28	Staminal column	Exerted out of corolla (1) included in corolla (2)
29	Anthers position	anthers near the column apex (1) anthers throughout the column (2)
		Fruit
30	Fruit shape	Ovoid (1) oblong (2) globose to subglobose (3)
31	Fruit apex	Acuminate (1) acute (2)
32	Fruit margin	Winged (1) wingless (2)
33	Fruit texture	Almost glabrous (1) long simple hairs (2) stellate hairs (3) strigose (4) pubescent (5) hispid (6)
34	No. of valves	10-valved (1) 5-valved (2)
		Seeds
35	Seed shape	Reniform (1) ovoid-reniform (2) triangular-reniform (3)
36	Seed texture	Glabrous (1) stellate hairy (2) long simple hairs (3) cottony hairs (4) silky hairs (5)

3. RESULTS

The present revision recorded five wild and six cultivated species, belonging to six sections of *Hibiscus* in Egypt (**Table 2**).

3.1. Taxonomic treatments

Hibiscus L. **Sp. Pl. ed. 1: 693 (1753); Masters 1868, p. 194; Bailey 1947, p 1483; Andrews 1952, p. 20; Hutchinson & Dalziel 1958, p 343; Hutchinson 1967, p. 544; Täckholm 1974, p. 355; Abedin 1979, p. 7;Townsend 1980, p. 264; Zohary 1987, p. 312; Boulos 2000, p. 107.**

Annual or perennial herbs, woody shrubs or small trees usually stellate-hairy. Leaves undivided, shallowly to deeply palmately lobed or digitately parted; stipules caducous or somewhat persistent. Flowers bisexual, large and showy, red, white or yellow, usually solitary and axillary, or in terminal racemes by suppression of upper leaves, sometimes in fascicles. Epicalyx usually of 5 or more segments, free or shortly connate at base, rarely fused to above halfway. Calyx 5- dentate or 5- partite, sometimes spathe-like and deeply cleft, persistent in fruit. Corolla 5 free petals, usually campanulate, adnate at base to the staminal column. Staminal column sometimes very long, divided into numerous filaments above, truncate at the tip. Ovary 5 locules, with 1-several ovules in each locule; Stylar column 5-branched above; Stigmas capitate or subspathulate. Fruit a loculicidally dehiscent 5-valved capsule, sometimes 10 (by false septa), membranous or leathery. Seeds reniform or globose, angular, glabrous, hairy, or woolly.

Type species: *Hibiscus syriacus* L.

Table 2. *Hibiscus* species recorded in Egypt within their sections according to **Hochreutiner** (**1900**)

Sections	Species
Azanza	*H. tiliaceus*
Bombycella	*H. syriacus* , *H. micranthus*
Furcaria	*H. cannabinus*, *H. sabdariffa* and *H. diversifolius*
Lilibiscus	*H. schizopetalus* and *H. rosa-sinensis*
Trionum	*H. mutabilis* and *H. trionum*
Pterocarpus	*H. vitifolius*

Key to the studied species of *Hibiscus*:

1 - Shrubs or small tree ……..…....2
- Annual or short lived perennial herbs …….. 8
2 - Stipules foliaceous, oblong-ovate, 1-3 cm long; ovary 10 locules due to false septa. ……..…..**1. *H. tiliaceus***
- Stipules filiform, linear, linear-lanceolate, 0.2-1cm long; ovary 5-locules ……..…..... 3
3- Plants densely hairy, tomentose …… 4
- plants glabrous or almost …… 6
4- Leaves unlobed; corolla less than 2 cm across; seeds covered by long cottony hairs …….. **2. *H. micranthus***
- Leaves lobed; corolla more than 2 cm across; seeds hairy but not cottony hairs 5
5- Calyx lobes ovate, acuminate; corolla white turning to pink ..…….. **3. *H. mutabilis***
- Calyx lobes triangular-lanceolate, acute; corolla yellow with a marron center …… ……..…… **4. *H.* vitifolius**
6- Staminal column included, antheriferous throughtout the column …….. ***5. H. syriacus***
- Staminal column exserted, antheriferous in the upper half of the column …….. 7
7- Pedicel 4-8 cm. long; petals apex entire …… …….. **6. *H. rosa-sinensis***
- Pedicel 8-12 cm. long; petals apex laciniate …… …… **7. *H. schizopetalus***
8- Stem, branches and petioles hairy or glabrous; leaves digitate ……..... 9
- Stem, branches and petioles with hard conical prickles; leaves angular or 3-5 lobed ……..…… ……... **8. *H. diversifolius***
9- Leaves covered with long hairs; leaves segments irregularly pinnatifid …… **9. *H. trionum***
- Leaves glabrous or almost; leaves 3-7 narrowly segments …….. 10
10- Leaves segments sharply serrate; calyx lobes triangular, apex long acuminate; Petals 4-8 cm. long ……...**10. *H. cannabinus***
- Leaves segments crenate-serrate; calyx lobes lanceolate, apex acuminate, enlarged and fleshy in fruit; Petals 3.5-4.5 cm long ……..…… ……..… **11. *H. sabdariffa***

1. *Hibiscus tiliaceus* L., **Sp. Pl. ed.1: 494 (1753); Masters 1868, p. 207; Bailey 1947, p. 1487; Bailey 1949, p.665; Hutchinson & Dalziel 1958, p. 345; Abedin 1979, p.9.**

A small evergreen tree, 4-10 m tall, with purplish branches, marked with the annular scars made by the deciduous stipules. Leaves 3-20(-30) cm long, 2-20 (-30) cm broad, orbicular to ovate, cordate at base, usually entire or undulate to crenate, acute to acuminate, almost glabrous above, hairy below, lower surface at base with linear glands on 1-5 nerves, coriaceous. Petioles shorter than the blades, 3-8 cm long. Stipules large, foliaceous, clasping the stem, 1-3 cm long, 0.5-1 cm broad, oblong-ovate, deciduous. Flowers solitary, clustered at the end of branches. Pedicel about 1 cm long, in fruit up to 2 cm, stellate pubescent. Epicalyx cup-shaped, 5-10 mm long, 7-12-toothed; teeth deltoid or triangular, 2-3 mm long. Calyx ½ to ⅓ fused, 1.5-3 cm long; lobes lanceolate, about 1 cm broad, each with linear gland on the central nerve. Corolla 5-8 cm across yellow with or without a purple center in the morning and become red towards evening. Petals obovate, 4.5-7 cm long, 4-5 cm broad, claw slightly hairy on margin. Staminal column about 3 cm long, included, anthers almost throughout its length. Ovary oblong, pubescent, 5 mm long. Capsule 2-3 cm long, oblong, apex acuminate, beaked, margin wingless, densely stellate hairy, 10 locules. Seeds many, dark brown 4-5 mm long, reniform, stellulate hairy.

Type: Herb. Hermann vol. 3: fol. 51 Linn. n. 258 (BM).

Distribution: The species is distributed in tropics and subtropics of both hemispheres. It is recorded in Egypt as cultivated ornamental tree.

Habitat: Cultivated in the gardens.

Specimens selected: Aswan botanic garden, 28.12.2013, Hafiz Rofaeel, 29893 (CAIM).

Economic importance: The tree used for ornamental in gardens. The fiber obtained from the bark is of fair quality **(Mabberley 1997)**. The roots, barks, leaves and flowers are said to be variously used in medicine.

Arabic name: unknown.

2. *Hibiscus micranthus* L. f., **Suppl. Pl. 308, 310 (1782); Masters 1868, p. 205; Täckholm 1974, p. 356; Abedin 1979, p. 15; Zohary 1987, p. 312; Boulos 2000, p.108.**

Synonyms: *Hibiscus ovalifolius* (Forssk.) Vahl, Symb. Bot. 1: 50 (1790).
Hibiscus gossypinus DC., Prodr. 1: 453 (1824).
Bombyx micranthus (L.F.) I. Riedl, in Fl. Iran. 120: 34 (1976).

Low stellate-hairy shrub 0.5- 1.2 m tall. Stems stiff, branched, erect or ascending. Leaves 1-3.5 cm long, 1-3 cm broad, scabrous, broadly ovate to lanceolate, undivided, serrate-dentate, the base rounded or truncate, the apex acute. Petiole 0.2-1.2 cm, strigose. Stipule 2-4 mm long, filiform. Flowers axillary, solitary. Pedicel 0.3-4 cm long, jointed or not, accrescent in fruit, strigose. Epicalyx 6-8 segments, 2-4 mm long, filiform, stiff. Calyx 3-4 mm long, 5 lobed; lobes lanceolate or triangular, acute. Corolla 1.2-1.5 cm across, white or pink. Petals 5, obovate, apex entire, 5-6 mm long, reflexed, stellate hairy outside. Staminal column included, up to 5 mm long, anthers near the column apex. Capsule globose, 5 valves, 7-9 mm across, apex acute, margin wingless, almost glabrous. Seeds numerous, 2 mm long, 1 mm broad, reniform, densely covered by long cottony hairs.

Type: Herb. Linn. n. 875. 2 (LINN).

Distribution: Tropical Africa, South Africa, Palestine, Arabia, Pakistan and India. In Egypt, the species was recorded as wild in Sinai, Red Sea and Geble Elba.

Habitat: Stony wadis, rocky ground and hillsides.

Specimens selected: (**S**): Barrag El-Samara (Sinai), 4.5.1927, Alfred Kaiser, s.n. (CAIM). (**GE**): Geble Shellal, S. E. Desert, 10.9.1936, M. Drar, s.n. (CAIM); Geble Ideib, Geble Elba, 7.3.1938, Shabetai, 5192 (CAIM). (**R**): Gebel Hamatā, 7.2.1961; V.Täckholm *et al*. s.n. (CAI)

Economic importance: The species can be used as an ornamental plant.

Arabic name: Khassia Rashid.

3. *Hibiscus mutabilis* L., **Sp. Pl. ed.1: 694 (1753); Bailey 1949, p.666; Abedin 1979, p. 10; Townsend 1980, P. 270**

Synonyms: *Abelmoschus mutabilis* (L.) Wall. ex Hassk., Cat. Hort. Bot. Bogor. 198 (1844).
Hibiscus sinensis Mill., Gard. Dict. ed. 8 2 (1768).
Ketmia mutabilis (L.) Moench, Methodus 617 (1794).

Shrub or small tree, 2-5 m tall, all parts densely stellate pubescent and mixed with simple, glandular yellowish or purplish hairs. Petiole 3-10 cm long. Leaves 5-15 cm long, usually broader than long, shallowly cordate-truncate at base, coarsely serrate obscurely-distinctly 3-7 lobed, lobes acute. Stipules small, linear-lanceolate. Flowers axillary, solitary, large, single or double. Pedicel longer than petiole, articulate near the top. Epicalyx 8-12 segments,

free, 0.7-2 cm long, linear to linear-lanceolate. Calyx free below or to the middle, 2.5-3 cm long, accrescent in fruit up to 4.5 cm, lobes ovate, acuminate. Corolla 5-8 cm across, white to pink, changing in color to more or less red by late evening, but not so in single flowers. Petals 4-6 cm long, obovate, pubescent outside, claw with ciliate margin. Staminal column included, bearing filaments almost throughout its length. Capsule 2-2.5 cm, subglobose, apex acute, margin wingless with long white simple hairs and a ground indumentum similar to that of the stem. Seeds numerous, 2-2.5 mm long, reniform, dark brown, dorsal and lateral sides with spreading, simple to 6 branched, up to 2 mm long hairs.
Type: H.U. Linn. Herb. n. 875. 20 (LINN), Lectotype.
Distribution: Native to China. Widely introduced as ornamental shrub in different parts in the world. In Egypt, It is recorded as a cultivated ornamental shrub in different gardens at Cairo, Giza and Delta region.
Habitat: Cultivated.
Specimens selected: Agriculture Museum, Dokki, 24.11.1952, Mahdy & M. Abdalla, s.n. (CAIM); Orman Garden, 24.11.1952, Mahdy, 1096 (CAIM).

Economic importance: It is with medicinal important, the plant is used as emollient, the flowers are used as a remedy of the chest diseases and leaves are applied to swellings, it is used also as an ornamental shrub.
Arabic name: Tartar

4. *Hibiscus vitifolius* L., Sp. Pl. ed. 1: 696 (1753); Masters 1868, p. 197; Andrews 1952, p. 22; Boulos 2000, p. 109.

Synonyms: *Hibiscus heterotrichus* DC., Prodr. 1: 450 (1824).
Fioria vitifolia (L.) Mattei, Bol. R. Orto Bot. Palermo 2: 71 (1916).

Shrub 0.8-1.5 m, densely stellate-tomentose, with glandular and long stiff tuberculate-based simple hairs, especially on the stems. Stems erect, branched. Lower leaves unlobed, the upper 3- 5 lobed. Leaf blade 3-7 (-10) cm long, 3-6 (-10) cm broad, ovate-cordate, dentate-serrate, the base cordate, the apex acute, usually softly pubescent. Petiole 2-8 (-12) cm long, villose. Stipules 3-5 mm, filiform, caduceus. Flowers axillary, solitary. Pedicel 1-3 cm. Epicalyx 9-12 segments, 0.8-1.2 cm long, subulate. Calyx 1.5-2 cm long, the lobes triangular-lanceolate, acute, elongate and accrescent in fruit. Corolla 5.5-7 cm across, yellow with a maroon center. Petals about 4 cm long, 2.5 cm broad, obovate, apex entire. Staminal column 1.5-2 cm long, included, bearing filaments almost throughout its length. Capsule 1-1.5 cm long, subglobose, apex acuminate, strigose, 5-winged. Wings transversely striate, thinly covered with short bristles along the veins and the margins. Seeds 2.5 mm long, reniform, tuberculate, glabrous.
Type: Sri Lanka, Paul Hermann, S.N. (BM), Lectotype.
Distribution: Tropical and subtropical Africa, Asia, Australia. In Egypt, it is recorded in Gebel Elba.
Habitat: Rocky hillsides and stony moist ground.
Specimens selected: (**GE**): Gebel Hikwal, Geble Elba, 28.2.1938, Shabetai, 5193 (CAIM); Wadi Akaw, Geble Elba, 27.10.1956, A. Khattab, 591 (CAIM). Wadi Yahameib, Geble Elba, 22.1.1962, V. Täckholm s.n. (CAI).
Economic importance: Because of its large, showy and attractive flowers, the plant can be used as ornamental shrub especially in rocky gardens.
Arabic name: Ribaay Hambook.

5. *Hibiscus syriacus* L., Sp. Pl. ed.1: 695 (1753); Bailey 1949, p. 666; Webb 1968, p. 255; Abedin 1979, p. 13; Townsend 1980, p. 268.

Synonyms: *Althaea frutex* Hort. ex Mill., Gard. Dict., ed. 8. (1768).
Hibiscus rhombifolius Cav., Diss. 3: 156. t. 69. f. 3. (1787).
Ketmia syriaca (L.) Scop., Fl. Carniol., ed. 2. 2: 45. (1772).

Glabrous shrub or small tree, mostly 1-3 m tall. Leaves 2.5-9 cm long, 1.5-5 cm broad, elliptic-rhomboid, irregularly dentate, the base cuneate, the apex acute, unlobed or obscurely to deeply 3-lobed. Stipules 4-6 mm long, linear. Petiole 0.5-2 cm long, pubescent. Flowers axillary, solitary. Pedicel 0.2-2 cm long, stellate pubescent. Epicalyx 6-8 segments, linear, stellate-hairy, 6-15 mm long. Calyx 1.2-2 cm. long, free to the middle, densely stellulate-tomentose, lobes lanceolate, acute. Corolla campanulate, 4-5 cm across, single or double, white, red, purple or bluish. Petals obovate, 3-5 cm long, stellate hairy outside, glabrescent inside, claw ciliate margined. Staminal column 3 cm long, included, filaments almost throughout its length. Capsule 1.2 cm across, 1.5-2 cm long, shortly ovoid, densely furnished with a yellowish stellate pubescent, apex acuminate, beaked, margin wingless, 5-valves. Seeds 2-4 mm long, reniform, brownish-purple, with a dense fringe of yellowish silky hairs on the dorsal side.
Type: H.U. Linn. Herb. n. 875. 24 (LINN).

Distribution: Native of temperate and subtropical Eastern Asia cultivated and naturalized in S. Europe. In Egypt, it is cultivated as ornamental shrub in many gardens.
Habitat: Cultivated.
Specimens selected: Agricultural Museum Garden, 4.10.1952, Mahdi & M. Abdallah, S.N. (CAIM).
Economic importance: The species is an ornamental shrub cultivated as hedge.
Arabic name: Ward Al Majal, Khatmiyah.

6*. Hibiscus rosa-sinensis* L., **Sp. Pl. 694 (1753); Bailey 1949, p. 665; Abedin 1979, p. 12; Townsend 1980, p. 269.**

Synonyms: *Hibiscus festalis* Salisb., Prodr. Stirp. Chap. Allerton 383 (1796).
Hibiscus boryanus DC., Prodr. 1: 446 (1824).
Hibiscus storckii Seem., Fl. Vit. 17 (1865).

Shrub or small tree, 1-4 (-5) m tall, glabrous or almost so in its vegetative parts. Leaves broadly ovate, 4-12(-15) cm long, at the base cuneate to truncate, entire, coarsely but bluntly serrate above, the apex subacute to shortly acuminate. Petioles 0.5-3 cm long. Stipules 5-10 mm long, linear. Flowers axillary, solitary, erect or subpendulous. Pedicel 1-8 cm long, glabrous, articulate near the top. Epicalyx 6-8 segments, linear-lanceolate, glabrous, 6-15 mm long. Calyx 1.5-3 cm long, tubular-campanulate, lobes 5-15 mm long, deltoid-lanceolate. Corolla 4-9 cm across, single or double, usually in various shades of red or white, more rarely yellow or orange. petals obovate or oblong-obovate, 5-9 cm long, obtuse or irregularly lobed at apex. Staminal column very long, 5-10 cm, exserted, anthers near the column apex. Capsule oblong-ovoid, about 2 cm long, glabrous, apex acuminate, margin wingless, 5-valves. Seeds about 5 mm long, reniform, blackish, moderately stellate-hairy.
Type: Herb. Hermann 3:4; n. 260 (BM).
Distribution: Native to China and East Asia. It is cultivated throughout the tropics and sub-tropics. In Egypt, It is widespread cultivated as an ornamental hedge shrub in gardens.
Habitat: Cultivated.
Specimens selected: Agricultural Museum Garden, Dokki, 30.6.1987, Badia & Abdallah Hassan, s.n. (CAIM); Aswan Botanical Garden, 26.5.1995, Hafiz Rofaeel, s.n (CAIM).
Economic importance: It is most extensively cultivated as an ornamental plant. Its mucilaginous petals can be used to polish shoes.
Arabic name: Khatmiyah Sine, Angurah Hindi.

7. *Hibiscus schizopetalus* (Dyer) Hook. f., **Bot. Mag. 106: t.6524 (1880); Bailey 1947, p. 1487; Bailey 1949, p. 665; Abedin 1979, p. 12.**

Synonym: *Hibiscus rosa-sinensis* L. var. *schizopetalus* Dyer, Gard. Chron., 12: 372, 568 (1879).
Shrub, 2-4 m tall, with spreading or usually drooping branches, glabrous. Leaves 2-7 cm long, 1-5 cm broad, elliptic, toothed, the base rounded, the apex acute or acuminate, glabrous. Petiole short, 0.5-2 cm long, glabrous. Stipules 3 mm long, subulate. Flowers axillary, solitary, pendulous. Pedicel 8-15 cm long, articulate nearly in the middle, glabrous. Epicalyx 5-8 segments, 1-2 mm long, triangular, glabrous. Calyx tubular, 1-1.5 cm long, irregularly 2-5 lobed, glabrous, lobes elliptic, acute. Corolla 7-9 cm across, red with pinkish streaks. Petals 5, 4-6 cm long, 2-3 cm broad, laciniate, recurved. Staminal column 8-10 cm long, exerted, anthers near the column apex. Capsule 3-4 cm long, 1 cm across, oblong, cylindric, apex acute, margin wingless, glabrous, 5-valves. Seeds smooth, glabrous.
Type: Kenya. Wanika hills, behind Mombasa, s.d., Kirk, s.n. (K). Lectotype.
Distribution: Native of East Tropical Africa. In Egypt**,** It is recorded as a cultivated ornamental shrub in many gardens.
Habitat: Cultivated.
Specimens selected: Agricultural Museum Garden, Dokki, 17.4.1987, Badia, s.n. (CAIM); Aswan Botanical Garden, 1.11.1996, Hafiz Rofaeel, s.n. (CAIM).
Economic importance: Widely spreading as cultivated ornamental shrub. It has been used as male parent in the crosses with ***Hibiscus rosa-sinensis*** L. and its varieties (**Abedin 1979; Mabberley 1997**).
Arabic name: Hibiscus Nagava.

8. *Hibiscus diversifolius* Jacq., **Collectanea, 2: 307 (1788); Masters 1868, p. 198; Andrews 1952, p. 24; Badry et al. 2015.**

Synonyms: *FURCARIA DIVERSIFOLIA* ULBR., VEG. ERDE 9 (III 2): 402 (1921).
Hibiscus paludosus Merr., Philipp. J. Sci. 3: 151 (1908).
Hibiscus scaber Lam., Encycl. 3: 350 (1792).

A tall perennial herb or undershrub up to 3.5 m high; branches as well as petioles and nerves of leaves armed with hard conical prickles. Leaves blade 3.5-9.5 cm. long, 0.7-10.6 cm broad, heteroblastic. Lower leaves cordate at the base, roundish, angular or 3-5 lobed, irregularly toothed; upper

leaves elliptic or lanceolate, the apex acute to obtuse. Stipules 3.5-6 mm, linear, pubescent. Petiole 0.8-10 cm long. Flowers in a terminal cluster, subsessile. Pedicel 3-15 mm long. Epicalyx 8-10 segments, subulate, often appendiculate, shorter than the densely bristly, pointed calyx-lobes, caducous, 7-12 mm long, slightly connate at the base, hispid. Calyx 16-22 mm long, 5-8.5 mm broad, covered with long stiff bristles, lobes narrowly triangular to lanceolate, apex acute. Corolla 3-4 times the length of the calyx, 2.3-4.6 cm long, 1.9-3 cm broad, shortly connate at the base, obovate, yellow with a red-purple centre, hairy on the abaxial surface. Staminal column 1.7-2.2 cm long, included, bearing filaments almost throughout its length, dark red-purple. Ovary 5-loculed. Ovules 2- more per locule. Capsule 1.7-2.3 cm long, ovoid, acuminate, pointed, margin wingless, covered with dense, long stiff appressed hairs. Seeds ovoid-reniform, about 1.4 mm, brown to black, smooth.

Type: Australia, 5. 1819, Cunningham, A. 38 (K).

Distribution: Native to tropical and subtropical Africa and naturalized with cosmopolitan distribution elsewhere in Asia, Australia, South and North America. In Egypt, it is recorded as wild species in Nile region (Qena Governorate).

Habitat: Nile banks and moist lands.

Specimens selected: (**N**): Ezbet Donkol, Nag Hammadi, 23.11.1993, A. Abd El-Mogali (CAIM).

Economic importance: The leaves and flowers are prepared as a side dish. The bark fibers are used as string to make mats **(Ruffo et al 2002)**.

Arabic name: Unknown.

9. *Hibiscus trionum* L., **Sp. Pl. ed.1: 697 (1753)**; **Masters 1868, p. 196; Andrews 1952, p. 22; Abedin 1979, p. 11; Townsend 1980, p. 265; Zohary 1987, p. 312; Boulos 2000, p. 108.**

Synonyms: *Hibiscus ternatus* Cav., Diss. 172 (1787).

Hibiscus africanus Mill., Gard. Dict. ed. 8, Hib. (1768).

Hibiscus trionum var. *cordifolius* DC., Prodr. 1: 453 (1824).

Annual herb, 15-75 cm tall, stem erect and branched in the lower half or with decumbent branches from the base, stem and branches with vertical lines of long crisped hairs and scattered simple or stellate strigose hairs, frequently with purplish lines or blotches. Leaves deltoid or roundish in outline, 3-7 cm long, 3-6 cm broad, 3- or imperfectly 5-palmatisect, the segments further irregularly pinnatifid with broad blunt lobes, the upper surface subglabrous, the lower with scattered strigose hairs. Petioles to 3 cm long, with a line of crisped hairs above and scattered strigose hairs. Stipules subulate, 3-4 mm long, strigose-ciliate, more or less persistent. Flowers 3-4 cm across, solitary, axillary, creamy or yellow, each petal with a dark purplish basal blotch. Peduncles 2.5-5 cm long, stellate-tomentose and with scattered strigose hairs. Epicalyx 9-12 segments, quite free, linear, strigose. Calyx membranous, about 1.2 cm long, inflated and very accrescent about 2 cm in fruit, strigose with large, usually geminate, tuberculate-based, strigose hairs along the conspicuous green to purplish veins, teeth deltoid, acute. Petals broadly rounded-obovate, 1.5-2.5 cm long, about twice as long as the calyx teeth. Staminal column about 4mm, included, with clavate hairs, bearing filaments almost throughout its length. Ovary 5-loculed with about 8-10- ovulate. Capsule subglobose, concealed within the bladdery calyx, apex acute, margin wingless, covered with long shining unicellular hairs and shorter white papillate hairs. Seeds triangular-reniform, 2.75 mm long, dark brown, minutely pitted, white-pustulose.

Type: Herb. Linn. n. 875.39 (LINN).

Distribution: Tropical and subtropical regions of the old world, naturalized in America and Australia. In Egypt, the species is recorded as a weed in Nile Valley, Oases and Mediterranean.

Habitat: Weed in summer crops, irrigation canal banks.

Specimens selected: (**N**): El-Zarabi, Abu Tig, 20.11.1993, A. Abd El Mogali, 1561(CAIM); El-Zagazig, Sharkiya, 11.6.2007, Mona Fikry, s.n (CAIM). (**O**): Baharia Oasis, 16.7.1933, M. Drar, s.n. (CAIM). (**M**): Rosetta, Alexandria, 21.8.1937, Shabetai, 6098 (CAIM).

Economic importance: The leaves are used to prepare diaphoretic syrup. The seeds contain about 23-24% oil. It is also sometimes cultivated as an ornamental summer plant.

Arabic name: Thil Shaytani, Shebbet.

10. *Hibiscus cannabinus* L., **Syst. Nat. ed. 10, 2: 1149 (1759); Masters 1868, p. 204; Bailey 1949, p. 665; Andrews 1952, p. 28; Webb 1968, p. 256; Townsend 1980, p. 267.**

Synonyms: *Hibiscus malangensis* Baker F., J. Bot. 77: 22 (1939).

Furcaria cannabina Ulbr., Veg. Erde 9 (III 2): 400 (1921).

Erect annual herb, about 0.7-2 (-4) m, simple or much branched, glabrous or almost so in its vegetative parts but the stem, branches, petioles and peduncles with scattered upwardly- directed curved spines. Leaves roundish-acuminate in outline, the

lowest entire or obscurely trilobed, the upper digitate to the petiole into 3-7 narrowly elliptic to linear-lanceolate segments, all sharply serrate, glabrous or sparsely strigose. Flowers solitary and axillary, sometimes pseudo-racemose. Epicalyx 7-10 segments, linear to linear-lanceolate, about 2 cm, setose-margined and sometimes finely hairy below. Calyx accrescent about 2.5 cm in fruit, the lobes long-acuminate from a triangular base, rigid and subspinose in the acumen, setose especially along the margins, each lobe with prominent median and lateral nerves bearing a woolly tomentum at least below, the median nerve bearing a swollen gland at about the middle. Petals 4-8 cm long, yellow, each with purplish spot at the base. Staminal column short, included, bearing filaments almost throughout its length. Capsule subglobose, apex acuminate, margin wingless, about 2 cm long, with long simple silky hairs above a shorter indumentums. Seeds about 5 mm, deltoid-reniform, minutely pitted, with scattered simple and stellate hairs.

Type: A specimen cultivated at Uppsala, probably of Indian origin.

Distribution: Native of tropical Africa and Asia. Cultivated in parts of S. E. Europe, S. W. Asia and other tropical and subtropical parts of the world. In Egypt, the species is cultivated as a fiber crop.

Habitat: Cultivated**.**

Specimens selected: Botanical section, Giza, 28.9.1931, Khattab, 971(CAIM); Giza, 19.10.1954, Khattab, 915 (CAIM); Botanical section, Giza, 24.9.1962, Khattab, s.n. (CAIM).

Economic importance: it is cultivated for its fiber which suitable for making string, binder twine, fishing net wrapping cloth. The leaves are edible and sometimes used as spinach.

Arabic name: Til, Teel.

11. *Hibiscus sabdariffa* L., **Sp. Pl. ed.1: 695 (1753); Masters 1868, p. 204; Bailey 1949, p. 664; Andrews 1952, p. 28; Abedin 1979, p. 9; Townsend 1980, p. 268; Boulos 2000, p. 108.**

Synonyms: *Abelmoschus cruentus* (Bertol.) Walp., Repert. Bot. Syst. 1: 310 (1842).

Furcaria sabdariffa Ulbr., Veg. Erde 9 (III 2): 402 (1921).

Hibiscus cruentus Bertol., Fl. Guatimal. 28 (1840).

Annual or short-lived perennial herb, erect, about 0.7-2 m tall. Stems simple or much branched, reddish, glabrous to stellate-hairy. Leaves roundish to elliptic in outline, the uppermost digitate, 3-7 lobed or reduced to a single lobe, lobes elliptic to elliptic-lanceolate, more or less regularly crenate-serrate, acute, glabrous or almost so. Petiole to 20 cm long. Stipules 6-8 mm long, subulate. Flowers 3-4 cm across, solitary, axillary, sometimes pseudo-racemose by suppression of the upper leaves. Epicalyx 8-10 segments, lanceolate-acuminate to oblong, about 1.5 cm long, setose, crimson-red. Calyx 1.5-2 cm long, 0.5 cm broad, accrescent in fruit, the lobes lanceolate-acuminate, becoming enlarged and fleshy in fruit, crimson-red, each with prominent median and lateral nerves, the former with a stoma-shaped gland at about the middle. Petals 3.5-4.5 cm long, yellow with a deep purplish spot at the base. Staminal column short, included, bearing filaments almost throughout its length. Capsule ovoid, apex acuminate, margin wingless, about 2-2.5 cm, glabrous or appressed pubescent, 5-valves. Seeds many, 4 mm, reniform, minutely pitted, with lines and tufts of stellate hairs.

Type: From Ceylon.

Distribution: Native of tropical and subtropical regions of the world. The species is widely cultivated in southern Egypt and the Oases, and escape from cultivation.

Habitat: cultivated and escaped in irrigated alluvial soil.

Specimens selected: Kharga Oasis, 20.11.1965, Khattab, 914 (CAIM); El-Zarabi, Abu Tig (**N**), 26.11.1993, A. Abd El-Mogali, 1570 (CAIM); Aswan Botanic Garden, 27.10.1995, Hafiez Rofaeel, 29096 (CAIM).

Economic importance: The leaves are eaten in salads, the fleshy calyx and capsules made into jam and are used in the preparation of a refreshing drink or other forms of preserve. The fibers of the stems are fairly tough and used for cord, binder twine, sackcloth. The medicinal value of the plant is recognized as diuretic, antiscorbutic and as a remedy for gastric complaints and hypertension **(AboZid and Mohamed, 2011)**, the flowers, fruits and seeds all being used for this purpose.

Arabic name: Karkadeh.

3.2. Numerical analysis

The UPGMA dendrogram of the genus ***Hibiscus*** (**Figure 2**) clearly discriminated 11 species producing two main clusters at the level 25 of average taxonomic distance. The first cluster (I) comprises 3 species viz. ***H. micranthus, H. vitifolius*** **and** ***H. trionum***. The second cluster (II) comprises 8 species which divided into two groups (IIa & IIb) at the distance level 16. The first group (IIa) comprises 3 species viz. ***H. syriacus*****,** ***H. diversifolius*** and ***H. tiliaceus***. The second group (IIb) comprises 5 species viz. ***H. cannabinus***, ***H. mutabilis***, ***H. rosa-sinensis***, ***H. sabdariffa*** and ***H. schizopetalus***.

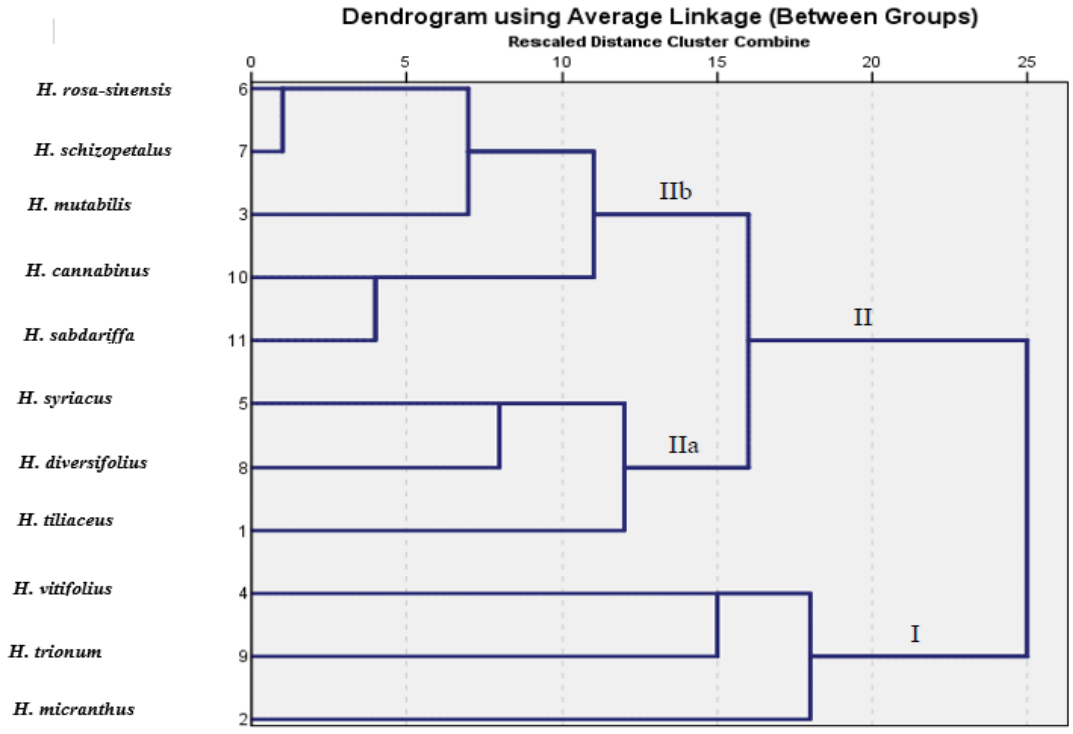

Fig. 2. The UPGMA dendrogram showing the relationships between studied species of *Hibiscus* in Egypt.

Table 3. Morphological variations among 11 studied species based on absolute similarity matrix

Species	Absolute Correlation between Vectors of Values										
	H. tiliaceus	***H. micranthus***	***H. mutabilis***	***H. vitifolius***	***H. syriacus***	***H. rosa-sinensis***	***H. schizopetalus***	***H. diversifolius***	***H. trionum***	***H. cannabinus***	***H. sabdariffa***
H. tiliaceus	1.000										
H. micranthus	0.027	1.000									
H. mutabilis	0.397	0.390	1.000								
H. vitifolius	0.222	0.398	0.231	1.000							
H. syriacus	0.289	0.163	0.144	0.070	1.000						
H. rosa-sinensis	0.286	0.086	0.664	0.164	0.058	1.000					
H. schizopetalus	0.368	0.071	0.624	0.090	0.038	0.835	1.000				
H. diversifolius	0.424	0.185	0.195	0.232	0.508	0.116	0.193	1.000			
H. trionum	0.075	0.278	0.381	0.381	0.115	0.028	0.141	0.154	1.000		
H. cannabinus	0.118	0.025	0.242	0.171	0.096	0.493	0.369	0.390	0.086	1.000	
H. sabdariffa	0.431	0.200	0.342	0.147	0.437	0.519	0.442	0.513	0.167	0.572	1.000

4. DISCUSSION

4.1. Taxonomic treatments

` Egypt is predominantly arid desert, with little effective rainfall, at most 200 mm y^{-1} and unequally distributed and on limited areas. Nile River is the main source for cultivation. Aridity and water shortage are the main constraint and major limiting factors facing growing and spreading the desert flora in Egypt. *H. micranthus* and *H. vitifolius* grow on desertic habitat (rocky hillsides and stony wadis), while other wild species grow in mesic habitat (moist lands and canal banks). *H. vitifolius* and *H. diversifolius* are mono-regional species which grow in GE and N phytogeographical region respectively. While other wild species found in more than one phytogeographical region. The cultivated species widely spreading in Egypt as ornamental plants specially *H. rosa-sinensis* and its cultivars. They grow in well-drained clay, silt, yellow soil and also in reclaimed soil. Anthropogenic activities have influenced the natural flora and vegetation of Egypt from several decades, weather impacted on the natural vegetation or the cultivated species escaped and naturalized. *H. cannabinus* and *H. sabdariffa* are cultivated in Egypt for its fiber and fleshy calyx respectively, also they are considered as escaped from cultivation.

4.2. Numerical analysis

The dendrogram of the genus *Hibiscus* (**Fig. 2**) clearly discriminated 11 species producing two main clusters at the level 25 of average taxonomic distance. Cluster (I) comprises 3 species viz. *H. micranthus, H. vitifolius* and *H. trionum* was separating by owing different characters: stem and petioles covered with stellate, villose, strigose hairs respectively; adaxial and abaxial leaf surface strigose, pubescent, and hairy. *H. micranthus* splitting from others by having leaves 1- 3.5 cm long; epicalyx filiform; calyx less than 3-4 mm long; corolla less than 3 cm diameter; petals 5-6 mm long; seeds covered by long cottony hairs. The second cluster (II) divided into two groups. The first group (IIa) comprises 3 species viz. *H. syriacus*, *H. diversifolius* and *H. tiliaceus* which splitting from other species in cluster II by stipules shape, epicalyx segments shape and texture, and fruit texture. But *H. tiliaceus* separating at level distance 12 by its specialist characters: tree; stipules foliaceous, oblong ovate, 11-30 mm long; leaves margin entire; Capsule densely stellate hairy, 10 locules.

The second group (IIb) comprises 5 species *H. cannabinus*, *H. mutabilis*, *H. rosa-sinensis*, *H. sabdariffa* and *H. schizopetalus*. Absolute similarity values of all 11 species ranged from 0.02 to 0.83 (**Table 3**). *Hibiscus schizopetalus* was found to be closely related to *Hibiscus rosa-sinensis* in dendrogram tree, which showed the maximum similarity value (0.83). *H. sabdariffa* and *H. cannabinus* showed similarity value (0.57), therefore, it was found to be closely related in dendrogram tree, which further supports the monograph of **Hochreutiner** (**1900**) and **Wilson** (**1994**). **Pfeil et al (2002)** based on chloroplast DNA sequences, sections *Furcaria*, *Azanza*, *Lilibiscus* are monophyletic groups while others are not. That is agree with our species in cluster II except of *H. syriacus* (sect. *Bombycella*) and *H. mutabilis* (sect. *Trionum*). The minimum similarity value (0.02) was observed between *H. cannabinus* and *H. micranthus*, *H. tiliaceus* and *H. micranthus*, and *H. rosa-sinensis* and *H. trionum*.

Conclusion: Morphological characters and identification keys as classical taxonomy are still important, in addition numerical analysis required to clarify the taxonomic relationships between studied species.

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مراجعة تصنيفية وتحليل عددى لجنس الهبسكس فى مصر

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تم فى هذه الدراسة حصر ومراجعة تصنيفية وتحليلًا عدديًا لجنس الهبسكس في مصر، سواء فى ذلك الأنواع البرية او المزروعة. اعتمدت الدراسة على جمع العينات النباتية الحية لبعض الأنواع التي شملتها الدراسة إلى جانب فحص العينات المعشبية المحفوظة بالمعشبات الرئيسية فى مصر. تم تسجيل أحد عشر نوعًا من الهبسكس، منها خمسة أنواع برية (*Hibiscus micranthus* L. f. ، *H. vitifolius* L.،*diversifolius* Jacq. ، *H. trionum* L. ،*sabdariffa* L.) وستة أنواع مزروعة (*H. cannabinus* L. ،*H. mutabilis* L. ، *H. syriacus* L. ،*H. rosa-sinensis* L. ، *H. schizopetalus* (Dyer) Hook. f. ،*H. tiliaceus* L.). تم إنشاء مفتاح نباتى للتفرقة بين أنواع جنس الهبسكس. تم عمل توصيف علمى لكل نوع يتضمن الإسم العلمى الصحيح ومرادفاته، والوصف المورفولوجي المبنى على فحص العينات المعشبية والعينات النباتية الحية، وكذلك التوزيع الجغرافى عالميا ومحليا وبيئات النمو وبعض العينات المعشبية المختارة والأهمية الاقتصادية إلى جانب العينات المرجعية الأصلية للأنواع. استخدم البرنامج الإحصائى SPSS (version 22) لإجراء التحليل العددي، حيث استخدمت ستة وثلاثون صفة مورفولوجية لأجزاء النباتات الخضرية والزهرية والثمرية. بناءاً على التحليل العددي تم فصل أنواع جنس الهبسكس إلى مجموعتين رئيسيتين. شملت المجموعة الأولى ثلاثة أنواع (*H. micranthus* L. *H. vitifolius* L., *H. trionum* L.)، وقسمت المجموعة الثانية إلى تحت مجموعتين: تحت المجموعة (أ) وتضم: *H. diversifolius* Jacq. ،H. *syriacus* L. ،*H. sabdariffa* L. وتحت المجموعة (ب) وتضم: *Hibiscus tiliaceus* L. ،*H. cannabinus* L. ،*H. mutabilis* L. ،*H. rosa-sinensis* L. *schizopetalus* (Dyer) Hook. f.

الكلمات المفتاحية: مصر، فلورة، هبسكس، الخبازية، التصنيف

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