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Systematic revision of *Leguminosae* in Egypt 2. *Lathyrus* L.

Abstract

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Taxonomic revision of the genus *Lathyrus* in Egypt is carried out. Basic characters of the taxa are given as well as key, synonyms and notes on distribution. SEM features of the seed coat were also considered.

Introduction

The genus *Lathyrus* L. comprises about 130 species widely distributed in the Northern hemisphere and South America, few in East and Tropical Africa. The genus includes 20-30 species of horticultural interest, the best known are: *Lathyrus odoratus* L. grown as an ornamental herb and *L. sativus* L. widely grown as crop plant.

According to Täckholm (1974: 278-281) the genus is represented in Egypt by 11 species viz. : *Lathyrus aphaca* L., *L. hirsutus* L., *L. setifolius* L., *L. sphaericus* Retz., *L. annuus* L., *L. hierosolymitanus* Boiss., *L. gorgoni* Parl., *L. sativus* L., *L. marmoratus* Boiss. & Bl., *L. pseudocicera* Pamp. and *L. cicera* L. She regarded the characters of pod, seeds and flower as the main features for distinction of the Egyptian species.

According to El Hadidi & Fayed (1994/95: 75-76) the genus is represented in Egypt by 9 species. This number is close to that of Boulos (1995: 71-72).

The genus *Lathyrus* has been subjected to several treatments by many authors, the most important is that of Gordon (1848) who united the two Linnaean genera *Orobus* and *Lathyrus* and recognized six sections within *Lathyrus*. The most recent treatment of the genus is that of Kupicha (1983) who recognized 13 sections within *Lathyrus*. Dogan & al. (1992) proposed a new classification based on numerical methods using vegetative and floral characters of Turkish *Lathyrus*. They classified the genus into nine sections grouped under two subgenera namely *Lathyrus* and *Orobus*.

The present account deals with the *Lathyrus* species native to Egypt; and is based on the collections of Cairo University Herbarium (CAI), Agricultural Museum (CAIM) and Assiut University Herbarium as well as field observations. The sections are arranged according to Kupicha (1983).

Characters of systematic value

The most important morphological characters of the native taxa of *Lathyrus* are summarized below:

Indumentum

The studied taxa possess glabrous leaves and stem, except *L. hirsutus* and *L. odoratus* with tuberculate hairs.

Stem

Stem angled, usually winged, wings ± as broad as the stem; unwinged stem are found in *L. sphaericus* and *L. aphaca.*

Leaves

Adult leaves are linear-lanceolate, 1-paired, parallel veined except *Lathyrus aphaca*, where leaflets are reduced into simple tendril. Rachis aristate, mucronate in young leaves, tendrillous in adults. Tendrils are much longer than leaflets in *L. odoratus* and *L. annuus*, as long as or slightly shorter than leaflets in the rest of the species. Tendrils range from simple in *Lathyrus aphaca, L. sphaericus,* and *L. sativus* to 1-3-branched in *L. annuus, L. marmoratus, L. gorgoni* and *L. pseudocicera* or 3-5(-7)- branched in *L. hirsutus* and *L. odoratus.*

Stipules are hastate, large in *L. aphaca,* semisagittate, smaller than leaflets in the rest of the studied taxa.

Peduncle

Usually carries 1-2 (-3) flowers, much longer than the subtending leaves in *L. odoratus, L. hirsutus* and *L. aphaca,* as long as or shorter than the subtending leaves in the rest of the species.

Flower

Calyx united with unequal, free lobes, as long as or much shorter than corolla. Petals range from sulphur or cream-yellow in *L. aphaca* to purple-blue or brick-red in the rest of the species. Some intermediate colours are also met within the same species. However, the flower colour is of minor systematic value on specific level. Style is usually straight in most of the species, twisted in *L. aphaca.* This character is useful above the specific level.

Fruit and seeds

Pod large (3-6 x 0.4-0.9 cm), linear, parallel sided, 7-8 seeded in *L. annuus, L. odoratus, L. hirsutus* and *L. sphaericus;*smaller and broader (2-3.5 x 0.6-1 cm), 4-5 seeded in the rest of examined taxa. The upper suture is either wingless or developed into 2 wings, 0.5-2 mm broad in *L. marmoratus, L. pseudocicera* and *L. sativus.* Valves

provided with a longitudinal elevated line in the middle in *L. gorgoni* var. *lineatus* and *L. pseudocicera* or without median line in the rest of the species (Fig. 1).

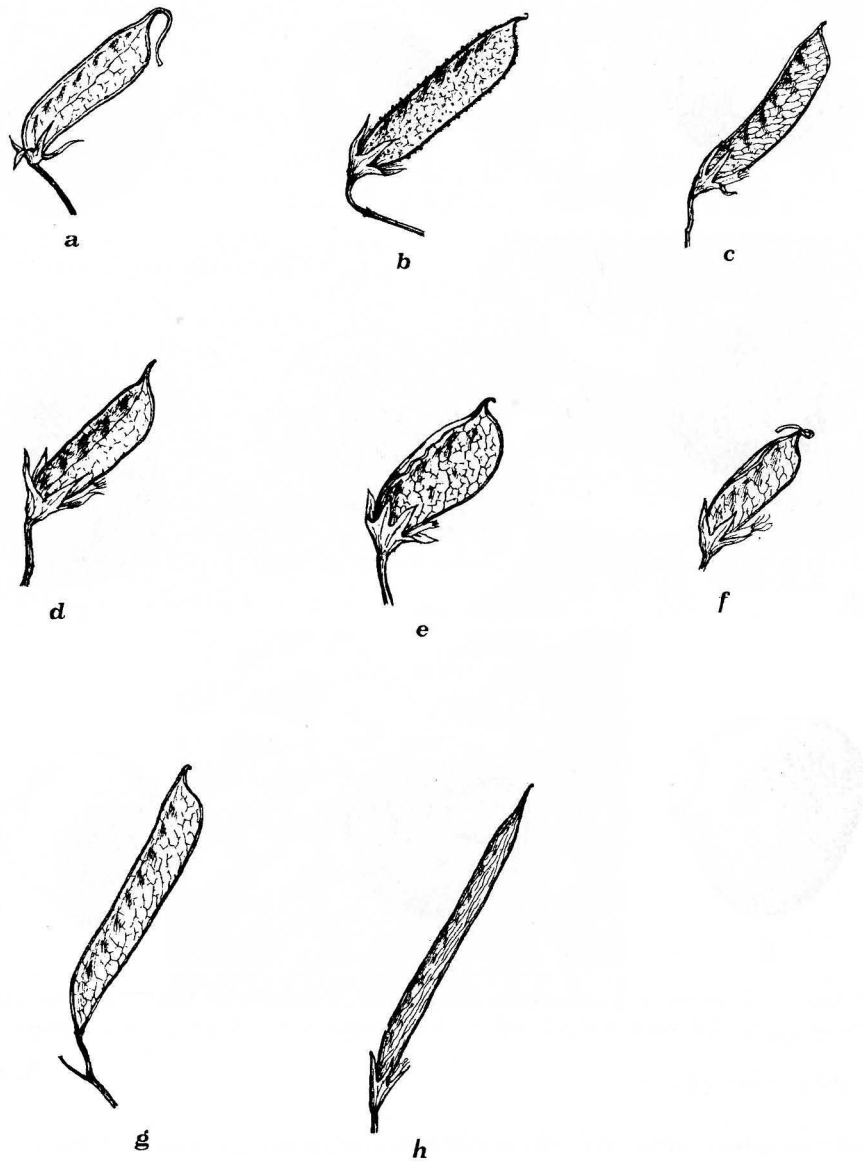

Fig. 1. Fruits of *Lathyrus:* a, *L. gorgoni* var. *linearis;* b, *L. hirsutus;* c, *L. aphaca;* d, *L. pseudocicera;* e, *L. sativus;* f, *L. marmoratus;* g, *L. annuus* var. *annuus;* h, *L. sphaericus.*

Seeds usually globoid, black to blackish brown, prominently tuberculate in *L. annuus* and *L. hirsutus* or finely tuberculate in the rest of the species (Fig. 2).

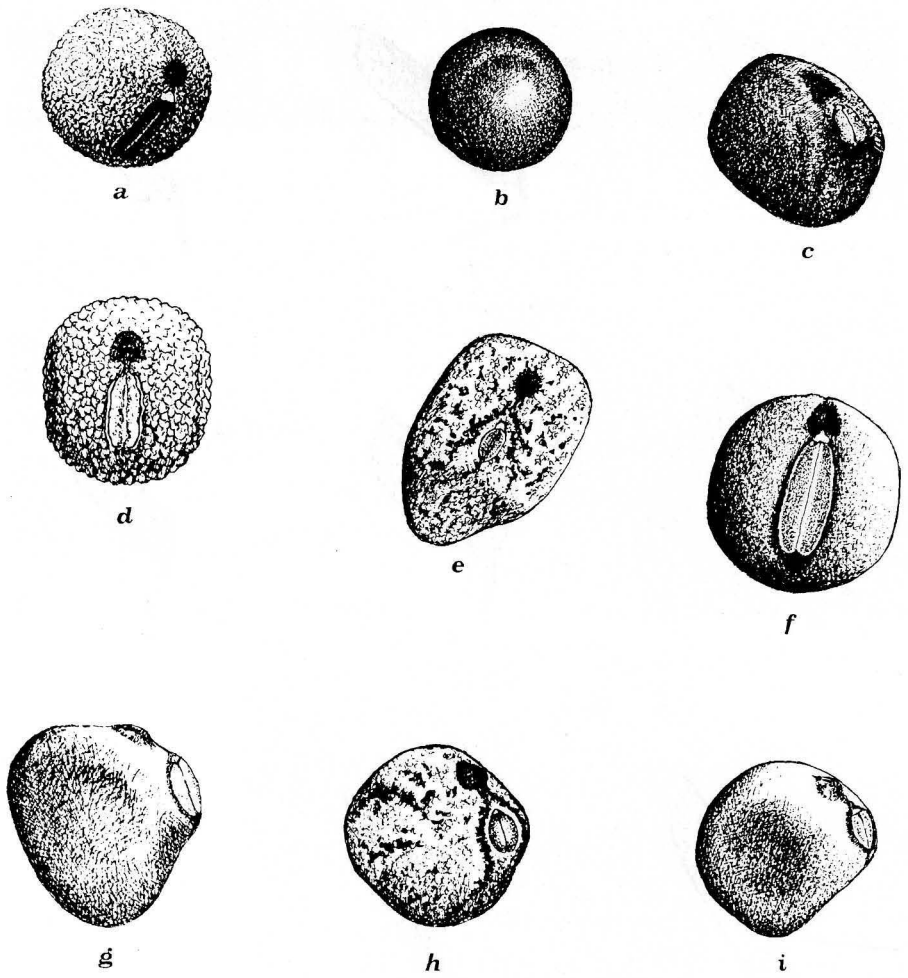

Fig. 2. Seeds of *Lathyrus:* a, *L. hirsutus;* b, *L. aphaca;* c, *L. sphaericus;* d, *L. annuus* var. *annuus;* e, *L. pseudocicera;* f, *L. odoratus;* g, *L. sativus;* h, *L. marmoratus;* i, *L. gorgoni* var. *linearis.*

SEM features of seedcoat

Lathyrus aphaca: epidermal cells isodiametric, polygonal, ± elongated in one direction; anticlinal boundaries channeled, straight, sinuous, smooth; periclinal walls domate, with flat or concave central portion micro-folded (Fig. 3a).

L. sativus: epidermal cells isodiametric to elongated in one direction; anticlinal boundaries channeled, papillate; periclinal walls domate, ± flat, papillate (Fig. 3b).

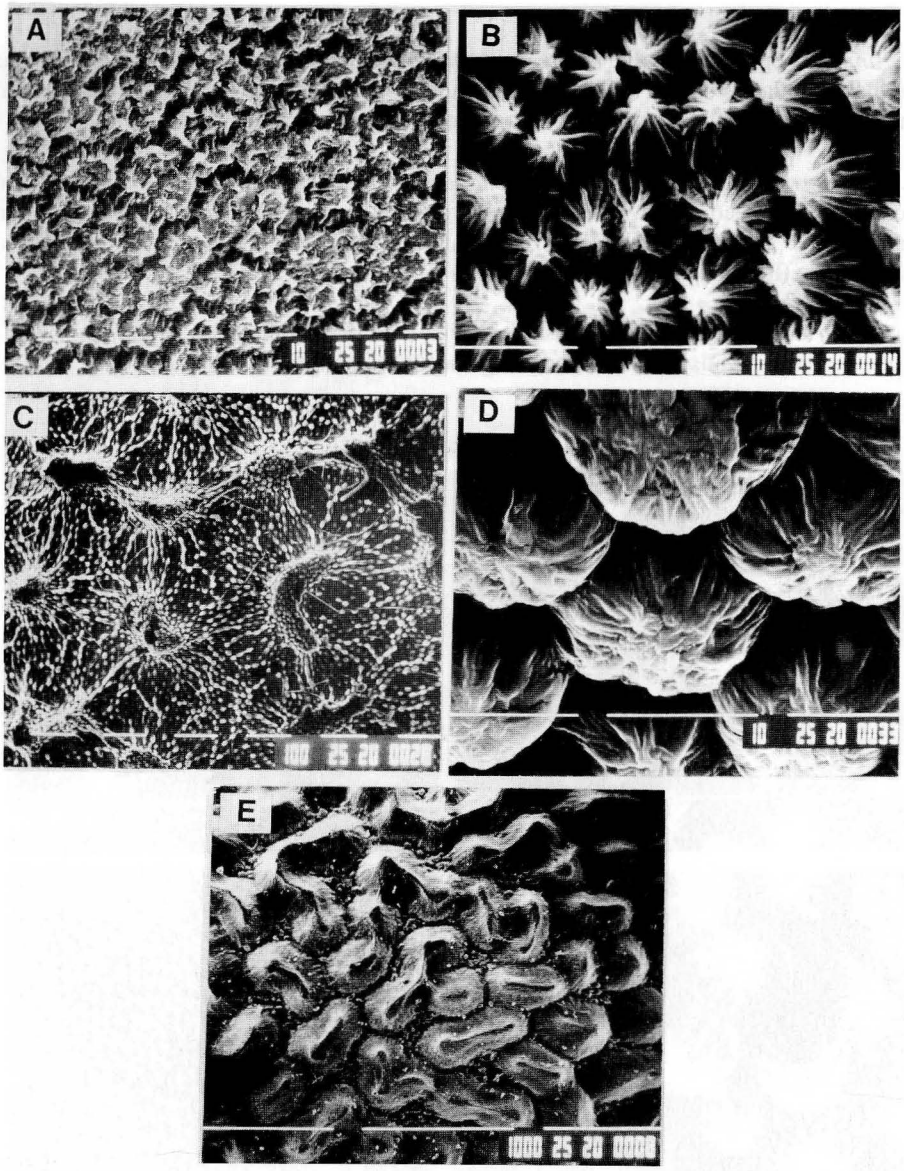

Fig. 3. SEM micrographs of seeds: A, *L. aphaca;* B, *L. sativus;* C, *L. hirsutus;* D, *L. odoratus;* E, *L. annuus var. annuus.*

L. hirsutus: epidermal cells isodiametric, polygonal, ± elongated in one direction; anticlinal boundaries ± channeled or not well defined, with micro-papillae; periclinal walls domate, flat to slightly concave, striate and papillate (Fig. 3c).

L. odoratus: epidermal cells isodiametric; anticlinal boundaries channeled and smooth; periclinal walls domate, folded (Fig. 3d).

L. annuus: epidermal cells isodiametric to elongated in one direction, 5-polygonal; anticlinal boundaries channeled, straight or undulate, with minute papillae; periclinal walls domate, with slightly concave to flat central portion, micro-papillate (Fig. 3e).

L. marmoratus, L. gorgoni and *L. pseudocicera* are characterised by nearly the same features of the seedcoat where the epidermal cells are isodiametric, the anticlinal boundaries are channeled, distinctly ribbed and smooth whereas the periclinal walls are domate, ± flat (Fig. 4a, b, c).

L. sphaericus: epidermal cells ± isodiametric; anticlinal boundaries channeled, sinuous, smooth; periclinal walls flat with medium globular or semiglobular papillae (Fig. 4d).

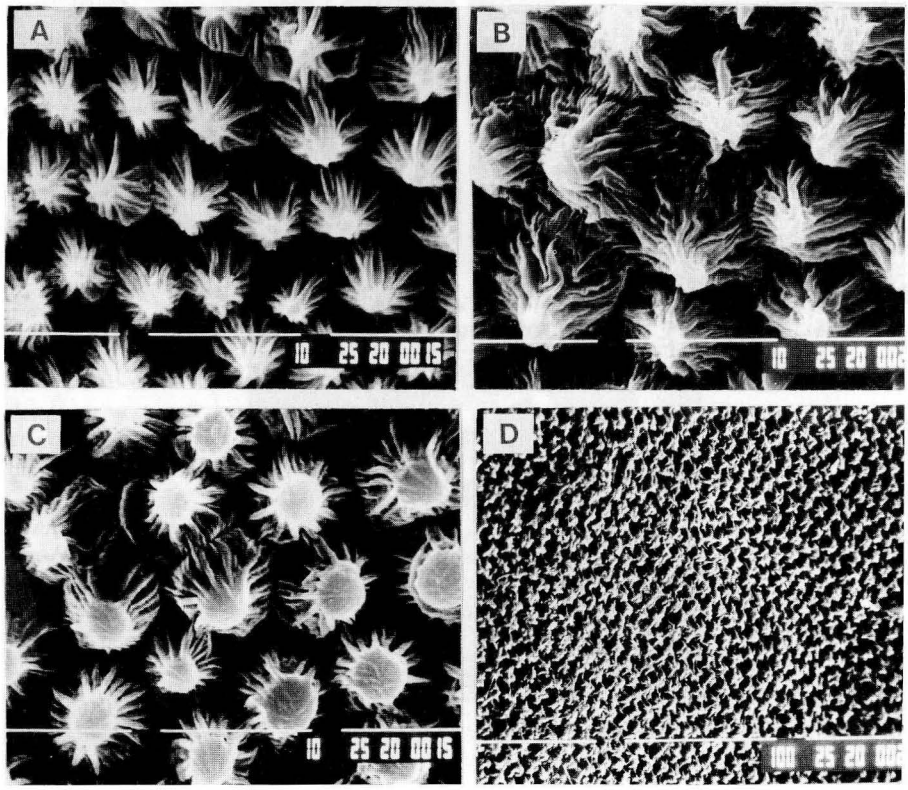

Fig. 4. SEM micrographs of seeds: a, *L. marmoratus* ;b, *L. gorgonii* var. *linearis* ; c, *L. pseudocicera* ; d, *L. sphaericus*.

Artificial key

1. a. Leaflet (at least the upper) reduced to simple tendril; stipules large, hastate and leafy, ovate with truncate base; flowers 1-2/peduncle, yellow or cream; style not twisted .. ..*L. aphaca*

b. Leaflet (at least the upper) well developed into a single pair with simple or branched tendrils; stipules small, semisagitate, flowers 1-6/peduncle, red, yellow, pink or purple; style twisted, rarely not twisted 2
2. a. Ovary and pod glabrous or with small glands 3
b. Ovary and pod with simple or tuberculate hairs 8
3. a. Stipules narrow and acute, subulate; tendrils branched, leaflets linear 3-9 x 0.3-0.8 cm; pod glabrous 3-5 x 0.5-0.9 cm; seeds 6-8 in each pod, tuberculate-rugulose ..... *L. annuus*
b. Stipules broader, lanceolate or ovate-lanceolate; tendrils simple, rarely branched 4
4. a. Upper margin of the pod with lateral nerves developed into distinct wings 0.5-2 mm broad; tendrils simple and branched, shorter than leaflets 5
b. Upper margin of the pod wingless; tendrils simple as long as leaflets 7
5. a. Pod 3-3.5x1 cm; wing up to 1 mm broad; seeds tuberculate ..... *L. sativus*
b. Pod 2-2.5 x 0.5-1 cm; wing not more than 0.5 mm broad; seeds smooth, mottled . 6
6. a. Valves of pod with prominent longitudinal line in the middle; stem ± ciliate ..... *L. pseudocicera*
b. Valves of pod without prominent line; stem glabrous ..... *L. marmoratus*
7. a. Leaflet linear, 3-5x0.1-0.4 cm, stem winged; pod small 2-3 x 0.7-1 cm, with prominent longitudinal line in the middle of each valve, glabrous; seeds 4-6/pod; style twisted ..... *L. gorgoni*
b. Leaflet lanceolate 5-9 x 0.1-0.8 cm; stem wingless; pod large 3-6 x 0.4 cm, glabrous or finely ciliate along margins without longitudinal prominent line, style not twisted ..... *L. sphaericus*
8. a. Tendril much longer than leaflets; pod 4-6 x 0.5-0.9 cm long; 8-10 seeded ..... *L. odoratus*
b. Tendril as long as leaflets, pod 2.5-4 x 0.4-0.7 cm; 4 (7-8) seeded ..... *L. hirsutus*

Systematic treatment

Section I: *Aphaca* (Mill.) Dumort., Fl. Belg.: 103 (1827).
= *Aphaca* Mill., Gard. dict. abr. 4 (1754).
Type. - *L. aphaca* L., Sp. Pl.: 729 (1753).

***L. aphaca* L., Sp. Pl.: 729 (1753)**

Syn.: *L. affinis* Guss. Fl. Sicul. Syn. 2:853 (1845); *L. polyanthus* Boiss. & Bl. in Boiss., Fl. Orient. 2: 602 (1873); *L. pseudoaphaca* Boiss., Diagn. 2:105 (1843).

Type material. - Described from Italy, France & England (Hb. Linn. 905/1).

Common weed in cultivated areas and roadsides of Mediterranean coastal land, Nile Delta and Oases of Egypt.

Known from C., W. & S. Europe, N. Africa, S.W. & C. Asia.

Representative specimens

M: Umm Rakham, between Matruh & Agiba, 23 Mar 1974, *V. Täckholm & al. s.n.* (CAI); Burg el Arab, 15 Feb 1965, *V. Täckholm & al., s.n.* (CAI); Gebel Lehfen, S. El Arish, 15 Mar 1930, *Drar s.n.* (CAIM).

Nv: Ashmoun, canal banks, 28 Feb 1942, *Shabetai 6340* (CAIM); Giza farm, 18 Mar 1937, *Shabetai 5011* (CAIM): Sennuris, El Faiyum, 12 Mar 1983, *Abdel Ghani 5785* (CAI).

O: Bahariya Oases, El Bawiti, 12 Apr 1935, *Drar s.n.* (CAIM); Ain Bishmu, 25 Jan 1978, *Abdel Ghani 45* (CAI); El Dakhla, Mut, 13 Feb 1952, *V. Täckholm & Kassas s.n.* (CAI); Bur El Hammam, El Kharga Oasis, 26 Feb 1935, *Drar s.n.* (CAIM).

Note: Davis (1970; 367) recognized 6 varieties within the species based on the fresh flower colour. It is becoming difficult to distinguish between these varieties in dried specimens, and in the absence of the flower.

Section II: *Lathyrus*

Syn.: *Cicercula* Medik. in Vorles Churpf. Phys. Ges. 2:358 (1787); *Lathyrus* sect. *cicercula* (Medik.) Gordon in Gren & Gordon, Fl. Fr. 1:481 (1848).

Lectotype: *L. sylvestris* L., Sp. Pl. : 733 (1753).

***L. sativus* L., Sp. Pl.: 730 (1753)**

Type material. - Described from Spain & France (Hb, Cliff., Hb. Linn. 905/6).

Common winter weed of cultivated land of the Nile Valley and Oases, rare in sandy soils of Mediterranean coastal land of Egypt.

Widely distributed in C., S. & E. Europe, Mediterranean to Iran and Afghanistan; cultivated in T. & S. Africa Europe and Australia for fodder.

Representative specimens

M: Burg el Arab, 8 Mar 1934, *Drar s.n.* (CAIM); Samouha, Alexandria, 23 Mar 1956, *Hadidi s.n.* (CAI).

Nv: Tell El Kebir, 6 May 1954, *Khattab s.n.* (CAIM); Giza, 19 Mar 1923, *Simpson 2067* (CAIM); Kom Ombo, 20 Jan 1927, *G. Täckholm s.n.* (CAI): Aswan, 27 Feb 1928, *Drar s.n.* (CAIM); Abu Simbel fields, 4 Feb 1963, *V. Täckholm & al.* 246 (CAI).

O: Bawiti, Bahariya Oasis, 20 Mar 1940, *Drar s.n.* (CAIM); Ganah, Kharga, 12 Feb 1929, *Drar & Khattab 70* (CAIM); El Dakhla, Ain El Sheikh Omran, 12 Feb 1937, *Hassib s.n.* (CAI); Qara Oasis, 17 1928; *G. Täckholm s.n.* (CAI).

***L. hirsutus* L., Sp. Pl.: 732 (1753)**

Type material. - Described from France & England (Hb. Linn. 905/3).

Common weed in cultivated fields and along canal banks of Nile Delta and Oases.

Known from C., S. Europe, Mediterranean, N. Africa to S. Asia; naturalised in U.S.A.

Representative specimens

M: Rosetta, 29 Apr 1927, *G. Täckholm s.n.* (CAI); Sheikh El Nassara, Damietta, 1 May 1922, *Simpson 1208* (CAIM).

Nv: Dessouk, canal banks, 3 Apr 1940, *Shabetai 7543* (CAIM); Sennuris, Faiyum, 5 May 1967, *Hadidi & al. s.n.* (CAI).
O: El Bawiti, Bahariya Oasis, 28 Mar 1934, *Drar s.n.* (CAIM); El Harra, Ain Abdullah, Bahariya, 28 Jan 1980, *Abdel Ghani 2361* (CAI); Ain Musarya, Dakhla, 13 Apr 1928, *Simpson 6124* (CAIM); Hindawi, Dakhla, 13 Feb 1968, *G. Romée s.n.* (CAI); Hibis temple, Kharga Oasis, 17 Mar 1967, *Hadidi & al. s.n.* (CAI).

***L. odoratus* L., Sp. Pl. : 732 (1753)**

Type material. - Described from Italy.
Widely cultivated in gardens in temperate and subtropical zones of both hemispheres. Cultivated in Egypt as an ornamental and escaped.

Representative specimens

M: Between Alexandria and Mersa Matruh, 25-28 Jan 1958, *Bot. Dept. Excursion s.n.* (CAI).
Nv: Faculty of Agricultural, Giza, 10 Jan 1941, *Hassib s.n.* (CAI).

Note: In cultivation the corolla may be white, yellow, purple, pink, violet or blue or combination of these.

***L. annuus* L., Demonstr. Pl. : 20(1753)**

Polymorphic species; two varieties are recognised according to the following key:

a. Leaflets large, 6-9 x 0.6-0.8 cm; tendril 3-5 branched; pod large up to 5 x 0.9 cm; seeds coarsly tuberculate, inflorescence peduncle 5-5.5 cm long ..... *L. annuus* var. *annuus*
b. Leaflets small, 3.5-9 x 0.2-0.7 cm; tendrils 1-3 branched; pod smaller 3.5-5 x 0.4-0.7 cm, seeds rugulose-tuberculate; peduncle 2.5-3 cm long ..... *L. annuus* var. *hierosolymitanus*

L. annuus* L. var. *annuus

Type material. - Described from Spain and Montpellier (Hb. Linn. 905/22 & 23).
Rare weed of cultivated fields and along water channels.
Known from C. Europe, E. Mediterranean, N. Africa, Iran to C. Asia.

Representative specimens

M: Wadi El Kassaba, Matrouh, 28 May 1935, *Drar s.n.* (CAI); Amria, 6 Mar 1912, *Bolland 460* (CAIM); Rafah, 14 Apr 1929, *Shabetai 1176* (CAIM).
Nv: Kafr Daoud, Behera, 3 May 1909, *Maire s.n.* (CAI); Kafr El Dawar, 20 Apr 1913, *Bolland 463* (CAIM).
O: Bawiti Oasis, 20 Mar 1940, *Drar 17* (CAIM).

***L. annuus* L. var. *hierosolymitanus* (Boiss.) Post, Fl. Syr. ed. 1: 292 (1896)**

Basionym: *L. hierosolymitanus* Boiss., Diagn. Pl. Orient. 9: 127 (1849); Fl. Orient. 2: 604 (1872).

Type material. - Israel, circa Hierosolymam, 1846, *Boissier.*

A common weed of barley fields along Mediterranean coastal land, rare in Oases.

Known from E. Mediterranean, Iraq, N. Iran to C. Asia.

Representative specimens

M: Mersa Matrouh, 11 Mar 1969, *V. Täckholm s.n.* (CAI); Wadi Umm Rakham, between Matrouh and Agiba, 23 Mar 1947, *V. Täckholm & al. s.n.* (CAI); Ras El Hekma, 16 Feb 1965, *V. Täckholm s.n.* (CAI); Burg El Arab, 7 Apr 1948, *Khattab 263* (CAIM); Rafah, 22 Mar 1928, *G. Täckholm s.n.* (CAI).

O: Bawiti, Bahariya, 5 Mar 1936, *G. Romée s.n.* (CAI).

Note: Davis (1970: 356), Täckholm (1974: 279) treated *L. annuus* and *L. hierosolymitanus* as two distinct species, while Townsend (1974: 562) regarded the Latter as conspecific to *L. annuus.* Careful examination of the available material showed the slose similarity of both taxa, in addition to the occurrence of intermediate forms. Accordingly, *L. hierosolymitanus* is treated in this work as a variant of *L. annuus.*

***L. marmoratus* Boiss. & Bl. in Boiss., Fl. Orient. : 606 (1872).**

Type material. - Lebanon in cultis arenois Syriae prope Tripoli, *Blanche 1208* (G).

Rare weed of cultivated fields, sandy soil and waste ground of Mediterranean coastal land of Egypt.

Known from Libya, Iraq and Turkey.

Representative specimens

M: Mersa Matrouh, 8 Mar 1939, *Drar s.n.* (CAIM); Ras El Hekma, 3 Mar 1956, *Imam s.n.* (CAI); Burg El Arab, 15 Feb 1965, *V. Täckholm s.n.* (CAI); Lake Mansala, 13 Aug 1928, *Mustafa & Sabet s.n.* (CAI); Bir Lehfen, S. El Arish, 21 Mar 1928, *G. Täckholm s.n.* (CAI); Rafah, 14 Apr 1929, *Shabetai s.n.* (CAIM).

***L. gorgoni* Parl. in Giorn. Sc. lett. Art. Sci. 62: 3 (1838); var. *lineatus* (Post) C.C. Townsend in Kew Bull. 25(3): 471 (1971).**

Basionym: *L. cicera* L. var. *lineatus* Post, Fl. Syria ed. 1: 292 (1896).

Type material. - Aintab, 1884; *Post s.n.* (BM) (selected by *Townsend* 1971: 471).

Rare in sandy soil of western Mediterranean coastal plain of Egypt.

Also known from Libya, Iraq, Israel, Jordan to W. Iran.

Representative specimens

M: Dabaa, barley fields, 23 Oct 1969, *Abbas & Shaer s.n.* (CAIM); Burg El Arab, 24 Mar 1961, *V. Täckholm s.n.* (CAI); Alexandria-Cairo desert road, 6 Apr 1948, *Khattab 266* (CAIM); Mariut, 13 Mar 1952, *Kamel s.n.* (CAI).

Note: *L. gorgonii* var. *lineatus* differs from the typical variety by its straight, strongly lineate legume, with prominent longitudinal line and shorter style. It is also distinguished from the typical *L. cicera* by its legume being provided with median elevated longitudinal line and somewhat longer style, 7-8 mm long.

Accordingly, the typical *L. gorgoni* and *L. cicera* reported by Täckholm (1974: 279-280) are not represented in Egypt.

***L. pseudocicera* Pamp. in Nuovo Gior. Bot. Ital. n.s. 31:213 (1924); subsp. *negevensis* (Plitmann) Plitmann & Heyn ex Greuter & Raus in Willdenowia 19: 32 (1989).**

Basionym: *L. cicera* L. var. *negevensis* Plitmann in Zoh., Fl. Palaest. 2: 458 (1972).

Type material. - N. Negev, Km 17 on Beersheb & Gaza road, 1949, *Zohary* 15537 (HUJ).

Very rare in Egypt, recorded from sandy plains of Burg El Arab (W. of Alexandria). Also known from Israel (E. Mediterranean element).

Representative specimens

M: Burg El Arab, 23 Apr 1929, *Drar s.n.* (CAIM); Burg El Arab, 22 Mar 1974, *V. Täckholm et &. s.n.* (CAI); N. of El Amria station, 25 Mar 1927, *G. Täckholm s.n.* (CAI).

Note: Closely related to the preceeding species from which it is separated by its sparsely ciliate stem and pods with 2-winged upper suture. Also differing from *L. marmoratus* by the presence of longitudinal line in the middle of the pod valves.

Section III: *Linearicarpus* Kupicha in Notes Roy. Bot. Gard Edinb. 41(2): 238 (1983).

Syn.: *Lathyrus* sect. *Orobastrum* Boiss., Fl. Orient. 2: 601 (1872).

Type: *L. inconspicuus* L., Sp. Pl. : 730 (1753).

***L. sphaericus* Retz., Observ. Bot. 3: 39 (1784).**

Type material. - Perhaps cultivated at Lund.

Very rare in Egypt in sandy desert of Libyan desert. Also known from S., W. & C. Europe, N. Africa ?, Ethiopia, Iraq, Iran to C. Asia.

Note: No specimens of *L. setifolius* reported by Täckholm (1974: 279) from Sinai have seen by the authors. The occurrence of this species in Egypt is uncertain.

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References

Boulos, L. 1995: Flora of Egypt. — Checklist, Al Hadara Publishing, Cairo, Egypt.

Davis, P. H. 1970: *Lathyrus* — In Davis, P. H.(ed.), Flora of Turkey and East Aegean Islands **3:** 328-369. — Edinburgh.

Dogan, M., Kena, A. & Tigin, C. 1992: Numerical taxonomic study on Turkish *Lathyrus (Leguminosae)* — Edinb. Jour. Bot. **49(3):** 333-341.

El Hadidi, M. N. & Fayed, A. A. 1994/95: Materials for Excursion Flora of Egypt. — Taeckholmia **15:** 75-76.

Godron, D. A. 1848: *Lathyrus.* — In Grenier, J. C. & Godron, D. A. (ed.), Flore de France **1:** 478-492 — Paris & Besanfon.

Kupicha, F. K. 1983: The infrageneric structure of *Lathyrus.* — Notes, Roy. Bot. Gard. Edinb. **41(2):** 209-244.

Täckholm, V. 1974. Students' Flora of Egypt ed. **2:** 278-281. — Cairo University, Cairo.

Townsend, C. C. 1974: *Papilionaceae* — In Townsend, C. C. & Guest, E.(ed.), Flora of Iraq **3:** 549-573-Baghdad.

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